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Predictors of Regular Physical Activity among Adults with Anxiety in Taiwan

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Predictors of Regular Physical Activity among Adults with Anxiety in Taiwan

by

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Dedication

to the Memory of My Father

for

His Belief and Support

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Predictors of Regular Physical Activity among Adults with Anxiety in Taiwan

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The purpose of this study was to test a conceptual model of physical activity in Taiwanese men and women with anxiety. The physical activity in persons with anxiety (PAPA) model was modified from Pender's revised health promotion model (Pender, Murdaugh & Parsons, 2002) and Spielberger's cross-sectional model of anxiety (Spielberger, 1966). Personal factors (gender, education, income adequacy, and trait anxiety) were hypothesized as having direct and indirect influences on physical activity. Cognition-emotion variables (state anxiety, perceived life stress events, perceived benefits of activity, perceived barriers to activity, perceived self-efficacy for activity, perceived family members' support for activity and perceived friends' support for activity) were hypothesized to directly influence on physical activity.

A non-probability sample of 252 participants was selected from five study sites. Data from 239 participants were analyzed using the EQS 5.7b program. The 89 men

and 150 women ranged from 20 to 60 years of age and were receiving outpatients care for anxiety. The initial hypothesized model was modified and the final version of the PAPA model provided a good fit to the data, with: a Comparative Fit Index of 1.00, a Root-Mean-Square Error of Approximation of .01, and a Chi-Square value of 24.79, with 24 degrees of freedom (p= .417).

The variables in the revised PAPA model explained 23.3% of the variance in physical activity. Three variables directly influenced physical activity: perceived life stress events, perceived benefits of activity and perceived self-efficacy for activity. The variables that indirectly influenced physical activity were gender, income adequacy, trait anxiety, state anxiety, perceived benefits of activity, perceived barriers to activity, and perceived friends' support for activity. Education and perceived family members' support for activity did not have either a significant direct or indirect influence on physical activity.

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CHAPTER ONE

INTRODUCTION

Background

Anxiety is a common experience in human life and a subjective emotional phenomenon that reflect unpleasant feelings (Lewis, 1970). Anxiety is the most prevalent type of psychological distress (Brown & Barlow, 1992). According to Healthy People 2010, more than 19 million people in the United States suffer from anxiety disorders (United States Department of health and Human Services (USDHHS), 2000).

In Taiwan, the major mental illness reported in clinical settings is related to symptoms of anxiety (The Department of Health, 2003). Development and growth of the Taiwanese economy have resulted in lifestyle changes and increases in mental problems (Wu & Tseng, 1985). In research by Cheng (1989), the prevalence of anxiety was 24.7% and found to be higher than the prevalence of depression in Taiwan. Because of the lack of compliance with Western treatments and the inefficiency of folk medicine therapies, dealing with anxiety symptoms is a big challenge for the mental health system in Taiwan.

Although medication and psychological therapy are major treatments for persons with anxiety (Tyrer, 1999), current research indicates that regular physical activity is helpful for improving anxiety symptoms and psychological outcomes (Petruzzello, Landers, Hatfield, Kubitz & Salazar, 1991; Plante, 1996). In addition, numerous studies support physical activity as an effective therapeutic technique for decreasing anxiety

levels. This is especially true for the moderate symptoms of general anxiety disorder or panic disorder (Paluska & Schwenk, 2000), as defined by the fourth revised edition of Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR) criteria (American Psychiatric Association (APA), 2002). Other studies found that physical activity is as effective as relaxation training for reducing moderate anxiety (Doan, Plante, DiGregorio & Manuel, 1995). Consequently, when considering the side effects of medication and the amount of time required for cognitive behavioral therapy, combining regular physical activity with other therapies is a potentially convenient and effective means to reduce anxiety symptoms and improve the quality of life for people with anxiety.

Due to the increasing prevalence of chronic diseases, illness prevention and health promotion are important aspects of health care policy in Taiwan (The Department of Health, 2003). Maintaining health status and promoting an optimal level of function are two goals for nurses who care for the chronically mentally ill (Yurkovich, Smyer & Dean, 1999). Regular physical activity is an appropriate way to achieve these two goals. Although physical activity is a health-promoting behavior (USDHHS, 1996; USDHHS, 2001) that protects people from illness and promotes their psychological well being, few studies were found that investigated the predictors of physical activity in persons with anxiety. In order to encourage people with anxiety to engage in physical activity, a greater understanding of the predictors of regular physical activity in those with anxiety is needed.

Purpose

The purpose of this research was to propose and test the Physical Activity for Persons with Anxiety (PAPA model). The PAPA model was developed to predict physical activity for Taiwanese adults with anxiety. The model includes eleven independent variables to predict the dependent variable of physical activity. The eleven independent variables include four personal variables (gender, educational level, income adequacy, and trait anxiety), and seven cognition-emotion variables: perceived life stress events (PLSE), state anxiety (SA), perceived benefits of activity (PBEA), perceived barriers to activity (PBAA), perceived self-efficacy for activity (PSEA), perceived family members' support for activity (FASA), and perceived friends' support for activity (FRSA).

Significance of the Study

This study yields information about the pattern of relationships among the twelve variables and the ability of the independent variables to predict physical activity in Taiwanese adults between the ages of 20 and 60 who experience anxiety. Three points relate to the significance of this study.

The first point of significance is in providing empirical data about the performance of physical activity in a specific population with anxiety in Taiwan. Since no previous research was found related to physical activity performance for the population with anxiety in Taiwan, this research fills a gap in knowledge about this

phenomenon. Future research can compare the data from this study with other populations and cultures, thereby improving the knowledge base in nursing.

The second point relates to discovering the correlation among the twelve variables proposed in the PAPA model. This study provides a holistic view of the relationships among personal factors, perceived life stress events, state anxiety, benefits of physical activity, barriers to physical activity, self-efficacy for activity, family members' support for activity, friends' support for activity, and regular physical activity. The data helps researchers better understand the patterns of inter-correlation among these variables. The results support the structure of the PAPA model to describe factors that influence physical activity directly and indirectly, and contribute to a body of fundamental knowledge about the predictors of physical activity in a population with anxiety. A next step for investigation may be to enlarge the sample size to examine which variables best predict physical activity for people with anxiety in Taiwan. Future researchers then can design and target strategies to help adults with anxiety engage in physical activity that results in reduced anxiety and improved health.

The third significance is related to information about gender differences in physical activity performance for Taiwanese adults with anxiety, and information about the effect of gender on cognition-emotion variables identified in this study. Since more women than men suffer from higher levels of anxiety (Barsky, Peekna & Borus, 2001), understanding gender differences is very important.

Statement of the Problem

Increasingly, studies support the benefits of regular physical activity in reducing moderate anxiety symptoms for the general population and for those with clinically diagnosed anxiety. Engaging in regular physical activity is meaningful and important, especially for people with anxiety. Numerous studies provide information about factors that predict physical activity in the general population; however, fewer studies focus on the factors that influence physical activity in a population with anxiety. The types, frequencies, durations, and intensities of physical activity for people with anxiety in Taiwan are unknown, and the motivations and limitations that influence an individual to engage in regular physical activity are unclear.

This raises several questions for the study population of Taiwanese adults with anxiety. What facilitators and barriers influence adults with anxiety to engage in physical activity? Do people with anxiety of different gender or income adequacy have different levels of physical activity performance? Is any model appropriate to explain factors that affect physical activity participation for adults with anxiety in Taiwan? To help people with anxiety to engage in regular physical activity for reducing anxiety levels and improving physical and mental health status, knowledge is needed concerning the proportion of people with anxiety who engage in physical activity and the factors that influence regular physical activity for this population.

Conceptual Model

The PAPA model (Figure 1.1) is comprised of twelve variables within three constructs. The three constructs are personal, cognition-emotion, and behavior outcome. Gender, educational level, income adequacy, and trait anxiety are in the personal construct. The cognition-emotion construct includes perceived life stress events, state anxiety, perceived benefits of activity, perceived barriers to activity, perceived self-efficacy for activity, perceived family members' support for activity, and perceived friends' support for activity. Physical activity constitutes the behavior outcome construct. The PAPA model was modified from Pender's revised health promotion model (HPM) (Pender, Murdaugh & Parsons, 2002) and Spielberger's cross-sectional model of anxiety (CSMA) (Spielberger, 1966).

The purpose of Pender's revised HPM was to predict health-promoting behavior (Pender, et al., 2002). The model has been employed to predict many health-promoting behaviors, such as physical activity (Chen, 1995; Stutts, 1997; Wu, 1999), hearing protection (Lusk, Ronis & Hogan, 1997; Lusk et al., 2003), and healthy nutrition (Herron, 1991) in different populations, such as American adults (Stutts, 1997), Taiwanese older adults (Chen, 1995; Wang, 1999), and Taiwanese adolescents (Wu, 1999). Three constructs comprise eleven concepts in Pender's revised HPM. These constructs include:

- Individual characteristics and experiences (consists of prior-related behavior and personal factors);

- Behavior-specific cognition and affect (consists of perceived benefits of action, perceived barriers to action, perceived self-efficacy, activity-related affect, interpersonal influences, situational influences, immediate competing demands and preferences, and commitment to a plan of action); and
- Behavioral outcomes (includes health-promoting behavior) (Pender, et al., 2002).

The premise of the model is that an individual's characteristics and experiences affect outcome behaviors directly and indirectly through behavior-specific cognition and affect (Pender, et al., 2002). Three constructs and the concepts of perceived benefits of activity, perceived barriers to activity, perceived self-efficacy for activity, and perceived family members' and friends' support for activity in the PAPA model were modified from Pender's revised HPM. A lack of research evidence support using the remaining concepts in the HPM (prior activity behavior, activity-related affect, situational influences, immediate competing demands and preferences, and commitment to a plan of action) to understand the relationships among variables for a population with anxiety. Since one assumption of model testing by SEM is that clear relationships must exist between variables in the research model, the remaining concepts in Pender's revised HPM were not included in the PAPA model.

The Cross-Section Model of Anxiety (CSMA) was developed by Spielberger (1966) to describe the relationships between anxiety and behavior. The CSMA describes the stimuli and anxiety responses that have direct and indirect effects on behavior outcomes. The CSMA includes seven elements: internal stimuli, external

stimuli, cognitive appraisal, trait anxiety, state anxiety, defense mechanism, and behavior outcome. An internal stimulus is related to one's thoughts, feelings, or biological needs, and an external stimulus is about stressors. State anxiety is the temporary dimension of anxiety related to stress responses, while trait anxiety is the character dimension of anxiety related to a long-term, stable condition of one's personality (Spielberger, 1983).

In the CSMA, state anxiety causes behavioral reactions directly through defense mechanisms and adaptive processes to avoid stressful situations (Spielberger, 1966, 1972, 1983). In addition, trait anxiety influences one's cognitive appraisal directly, and cognitive appraisal impacts how an individual perceives stressful situations (Spielberger, 1966). State and trait anxiety are positively related to each other (Spielberger, 1983).

Three variables in the PAPA model (see Figure 1.1) were adopted from Spielberger's CSMA (1966): trait anxiety, state anxiety and perceived life stress events. Trait anxiety is incorporated into the personal factors along with the variables of gender, income adequacy, and educational levels, because trait anxiety is the enduring character dimension of personality (Spielberger, 1966, 1983). State anxiety is under the construct of cognition-emotion, because state anxiety is the cognitive process that responds to stress (Boudarene, Legros & Timsit-Berthier, 2002; Lazarus & Folkman, 1984; Selye, 1984; Spielberger, 1966, 1972, 1983), which is an external stimulus in the CSMA. The variable of perceived life stress events is under the construct of cognition-emotion, because the process of perceived stress is a cognitive process (Lazarus & Folkman, 1984) that affects behaviors directly and indirectly through state anxiety (Spielberger, 1966).

In the PAPA model, four personal factors are proposed to have a direct influence on physical activity and an indirect infuence through seven cognition-emotion variables. The seven cognition-emotion variables in the model are proposed to have a direct influence on physical activity performance (see Figure 1.1).

Research Hypotheses

For testing the PAPA model, the following hypotheses were examined in this research. In each hypothesis, statistical significance implies rejecting the null hypothesis at an alpha level of .05.

1. Gender, educational level, income adequacy, and trait anxiety have statistically significant direct influences on the level of physical activity.
2. Gender, educational levels, income adequacy and trait anxiety have statistically significant indirect influences on the level of physical activity through the cognition-emotion factors (PLSE, SA, PBEA, PBAA, PSEA, FASA, and FRSA).
3. Perceived life stress events have a statistically significant direct negative influence on the level of physical activity.
4. Perceived life stress events have a statistically significant indirect influence on the level of physical activity via state anxiety.
5. State anxiety has a statistically significant direct negative influence on the level of physical activity.

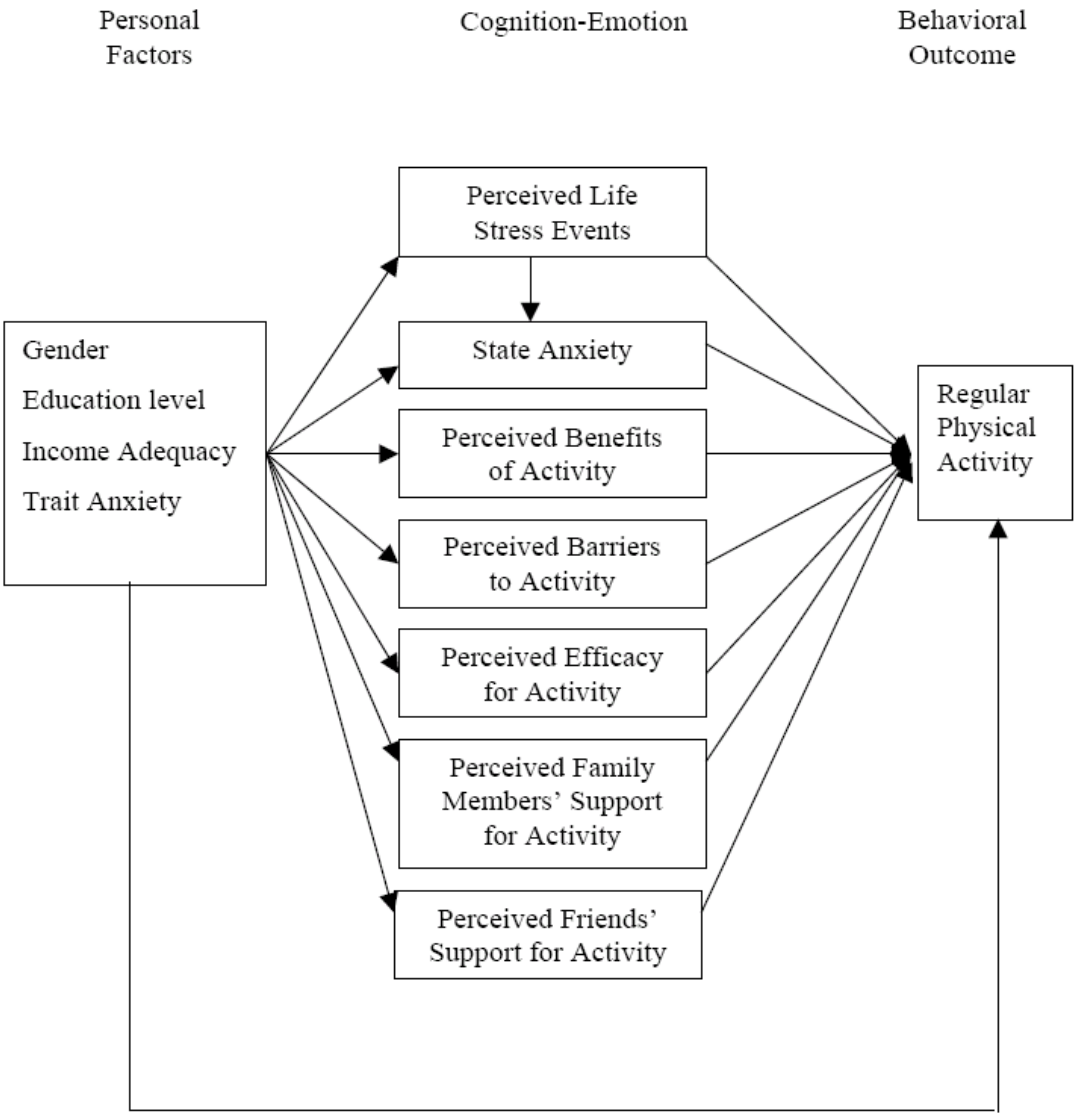

Figure 1.1: The Model of Physical Activity for Population with Anxiety (PAPA)

6. Perceived benefits have a statistically significant direct positive influence on the level of physical activity.
7. Perceived barriers have a statistically significant direct negative influence on the level of physical activity.
8. Perceived self-efficacy has statistically significant direct positive influence on the level of physical activity.
9. Perceived family members' support has a statistically significant direct positive influence on the level of physical activity.
10. Perceived friends' support has a statistically significant direct positive influence on the level of physical activity.

Operational Definitions of the Concepts

The twelve variables in the PAPA model are defined below.

Gender, Educational Level, and Income Adequacy

Gender, educational level, and income adequacy were measured by items on the Demographic Inventory. Both male and female participants were included. Education was defined as number of years of school. Income adequacy was defined in two ways: (1) perceived income adequacy and (2) individual's monthly income. Perceived income adequacy was used for this study.

Trait Anxiety

Trait anxiety was defined as an individual's long-term condition of anxiety emotion or one's enduring personality traits of anxiety (Spielberger, 1972). Trait

anxiety was measured by the trait anxiety subscale (Y-2) in the State-Trait Anxiety Inventory Form Y (Spielberger, 1983).

State Anxiety

State anxiety was defined as a temporary dimension of anxiety related to stress responses (Spielberger, 1972). State anxiety was measured by the state anxiety subscale (Y-1) in the State-Trait Anxiety Inventory Form Y (Spielberger, 1983).

Perceived Life Stress Events

Perceived life stress events was defined as an individual's perception about the degree of stressfulness of his or her responses to recent life stress events were during the past six months. The Stressful Life Events Checklist (SLE), revised from Cheung's (1998) Pleasant and Stressful Life Events Questionnaire, was used to measure this variable.

Perceived Benefits of Activity

Perceived benefits of activity was defined as an individual's subjective knowledge or experience regarding the advantages of physical activity. The Exercise Benefits Subscale of the Exercise Benefits/Barriers Scale (Sechrist, Walker & Pender, 1987) measured this variable.

Perceived Barriers to Activity

Perceived barriers to activity was defined as perceptions of limitation to physical activity. The Exercise Barriers Subscale of the Exercise Benefits/Barriers Scale (Sechrist, et al., 1987) measured this variable.

Perceived Self-Efficacy for Activity

Self-efficacy was defined as "people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances" (Bandura, 1986, p.391). From the health promotion model, perceived self-efficacy is "a judgment of one's abilities to accomplish a certain level of performance" (Pender, et al., 2002). In this study, perceived self-efficacy is one's confidence in the ability to engage in physical activity. This variable was measured by the Exercise Confidence Survey (Sallis, Pinski, Grossman, Patterson & Nader, 1988).

Perceived Family Members' and Friends' Support for Activity

Perceived family and friends' support was defined as an individual's cognitive appraisal of being reliably connected to family members and friends in relationship to performing physical activity. Perceived family members' support for activity was measured by the Social Support and Exercise Survey for family members or members of the participant's household (Sallis, Grossman, Pinski, Patterson & Nader, 1987). The Social Support and Exercise Survey for friends (Sallis, et al., 1987) measured perceived friends' support for activity.

Physical Activity

Physical activity was defined as "any bodily movement produced by skeletal muscles that results in energy expenditure that can be measured in kilocalories" (Caspersen, Powell & Christenson, 1985, p.126). Physical exercise is one type of physical activity. The measurement of energy expenditure depends on the amount of kilocalories expended based on "muscle mass producing bodily movements and intensity,

duration and frequency of muscular contractions" (Caspersen, et al., 1985, p.127). Level of physical activity was measured by the Past Year Physical Activity Checklist, revised Chen's (1995) Past Year Regular Physical Exercise Questionnaire.

Assumptions

In conducting this research, the investigator made the following assumptions:

1. Both physical health and psychological health are important factors for an individual's satisfactory life quality.
2. An individual's behaviors can be changed by certain factors.
3. Some factors that influence behaviors can be identified and measured, and the relationships among factors can be analyzed.
4. Participants in this study were able to understand the questionnaires and give reliable responses to the items.
5. The data and results from this research can be replicated by other studies under the same circumstances.

Limitations

The findings of this study can be interpreted only for Taiwanese men and women with anxiety. The findings may not be extended to people with other mental diseases. The data show the relationships among personal factors, cognition-emotion variables and physical activity for adults with anxiety in Taiwan. The information contained in this study may not be interpreted for people younger than 20 or older than 60, and not for

people living in other countries with different cultures. In addition, the information obtained from questionnaires and interviewing may have some bias due to memory capacity, personal influences, and social desirability.

CHAPTER TWO

LITERATURE REVIEW

The literature review for this study focused on the key topics needed to understand this research. The review includes studies about populations with anxiety, a discussion of two models related to the PAPA model, an overview of the determinants of physical activity (including the eleven concepts proposed in the PAPA model), and a summary. The two models related to the PAPA model are Pender's revised health promotion model and Spielberger's cross-sectional model of anxiety. The eleven concepts that address determinants of physical activity include four personal factors (gender, educational levels, income adequacy and trait anxiety), seven cognition-emotion variables (perceived life stress events, state anxiety, perceived benefits of activity, perceived barriers to activity, perceived self-efficacy for activity, perceived family members' support for activity, and perceived friends' support for activity), and behavioral outcome (physical activity).

Most of the literature about these subjects was drawn from CINAHL, MEDLINE, Health Source: Nursing/Academic Edition, Psychology and Behavioral Sciences Collection, PsycINFO, Sociological Collection and SPORTDiscus. The literature was searched for studies between 1980 and 2005. Some information related to cultural issues and research about Taiwanese people was drawn from the databases of the University of Texas libraries and from the National Central Library, Taiwan Branch.

Population with Anxiety

Anxiety has been discussed in many theories from the nineteenth century to the present based on various perspectives. A general definition of anxiety is: an unpleasant mood or emotion that is concerned with uncertainty, caused by an unknown or nonspecific source, toward the future (Tyrer, 1999; Whitley, 1992). In the DSM-IV-TR, anxiety is defined as the person feels persistently dysphoria or somatic symptoms of tension cause by future danger or misfortune (APA, 2002).

People with anxiety usually feel out of control about everything, and may be anxious and nervous all of their lives (Akiskal, 1998; American Psychology Association (APA, 2002). Some have problems with cardiovascular, gastrointestinal, and urinary tract symptoms (Hoehn-Saric, 1998), or problems with mood disorder (Judd, et al., 1998). In general, people with anxiety have sleep problems, feel restless, and have little patience with family, work, and even with themselves (Noyes, 1992). When these symptoms occur frequently and continue for a long time, then a person may be diagnosed with an anxiety disorder (APA, 2002). Anxiety disorders are the most prevalent psychological diseases in the United States (U.S.) (Brown & Barlow, 1992), and about 10.1% of the U.S. population currently have anxiety disorders (Costa e Silva, 1998).

Anxiety disorders include 14 sub-types in DSM-IV-TR (APA, 2002) that can be generalized into six sub-types (Craske, 1999): obsessive-compulsive disorder, panic disorder with agoraphobia, specific phobia, social phobia, posttraumatic stress disorder, and generalized anxiety disorder. Obsessive-compulsive disorder is characterized by obsessive thoughts or compulsive behaviors cause high level of anxiety that influences an

individual's function. Panic disorder with agoraphobia is the presence of unexpected panic attacks that involve a period of discomfort feeling and somatic symptoms caused by specific situations or places. Specific phobia is the presence of unreasonable fear caused by specific object or situation. Social phobia is the presence of persistent anxiety symptoms when the person is exposed to unfamiliar people. Posttraumatic stress disorder is the person reexperienced traumatic events that involved intense fear, anxiety and helplessness. Generalized anxiety disorder is excessive worry about a number of events at least 6 months (APA, 2002). Persons with these sub-type anxiety disorders are persistently experienced moderate or high level of anxiety that influence their life, working ability and social interaction.

In Taiwan, the major mental illness needing help in the clinical setting also is related to symptoms of anxiety (The Department of Health, 2003). Since the Taiwanese culture impacts beliefs about anxiety, most symptoms of anxiety shown by Taiwanese people are voiced as somatic problems (Juang, Wang, Fuh, Lu & Su, 2000; Yeh, 1985). A person demonstrating a high level of anxiety may not be accepted by society in Taiwan. People in Taiwan believe that a person with a high level of anxiety is shameful, because anxiety involves an improper expression of emotion that disturbs other people. This negative attitude about anxiety is a result of Confucianism expressed in Chinese culture. Confucianism emphasizes group-centered social life and requires a proper interpersonal attitude (called Li, 禮 in Chinese) that makes a society harmonious, by requiring every individual to have a proper way to treat each other (Huang, 1997). For this reason, people in Taiwan have difficulty expressing their personal emotions, even in their own

social networks (King & Bond, 1985). Patients in clinic describe somatic complaints rather than expressing their problems using emotional or psychological terms (Cheng, 1989; Wu & Tseng, 1985).

Overall, people with anxiety are a vulnerable population. Vulnerable populations are defined as high-risk populations, due to the limitation of health resources they can obtain (Flaskerud & Winslow, 1998). People with high levels of anxiety sometimes are unable to do tasks involving learning, working or exercising (APA, 2002; Noyes, et al., 1992). The population with anxiety is easily ignored by the routine social system, and they frequently smoke, drink alcohol, or take drugs to reduce their anxiety without seeking medical help (Costa e Silva, 1998; Young, Klap, Sherbourne & Wells, 2001). All of these factors potentially contribute to the acquisition of chronic diseases and resultant poor health. For these reasons, the health system burden of anxiety disorder is higher than acquired immune deficiency syndrome and many types of cancers (Costa e Silva, 1998). Health providers need to pay more attention to the population with anxiety.

Two Models Related to the PAPA Model

The PAPA model used to predict physical activity in this research was modified from two models: Pender's revised Health Promotion Model (HPM) and Spielberger's Cross-Sectional Model of Anxiety (CSMA). The researcher adopted three constructs and eight concepts from Pender's revised HPM and three concepts from Spielberger's CSMA.

Pender's Revised Health Promotion Model

The health promotion model, developed by Dr. Pender in 1982 and revised in 1987, 1996 and 2002, is based on many empirical studies (Pender, 1982, 1987, 1996; Pender, et al., 2002). Due to the increasing prevalence of chronic diseases after the 1950s, disease prevention and health promotion are important issues of health care policy in the United States. For that reason, the purpose of the HPM is to predict health-promoting behavior. The revised HPM uses ten concepts to predict an outcome variable, health-promoting behavior by direct effect or indirectly effect (Pender, et al., 2002).

Three constructs comprise eleven concepts in Pender's revised HPM (Pender, et al., 2002). Three constructs include an individual's characteristics and experiences, behavior-specific cognition and affect, and behavioral outcome. Two concepts, prior-related behavior and personal factors, are included in the construct of an individual's characteristics and experiences. The construct of behavior-specific cognition and affect consists of eight concepts: perceived benefits of action, perceived barriers to action, perceived self-efficacy, activity-related affect, interpersonal influences, situational influences, immediate competing demands and preferences, and commitment to a plan of action. The behavioral outcome construct involves the concept of health-promoting behavior.

In general, most of the concepts in the revised HPM have been tested and are reported in the literature. Many researchers focused on distinct parts of the original HPM (Pender, 1996) or on a revised HPM (Pender, et al., 2002) to predict physical

activity in different populations. Research population examples included male and female adults in America (Stutts, 1997), Thai elders (Asawachaisuwikrom, 2001), Taiwanese older adults (Chen, 1995; Wang, 1999), and Taiwanese adolescents (Wu, 1999). The HPM was not only a good predictor for a general population (Wang, 1999), but also for persons with disorders (Stuifbergen & Becker, 1994). However, even though the HPM is composed of clearly specified causal paths (Johnson, Patner, Bottorff & Hayduk, 1993; Tillett, 1998), the relationships among the various factors require further clarification, especially for exploring new concepts using the revised model.

Spielberger's Cross-Sectional Model of Anxiety

The Cross-Section Model of Anxiety was developed by Dr. Spielberger (1966) to describe the relationships between anxiety and behavior. The CSMA describes the stimuli and anxiety response effect on behavior outcomes directly and indirectly. The CSMA includes seven concepts: internal stimuli, external stimuli, cognitive appraisal, trait anxiety, state anxiety, defense mechanism, and behavior outcome. An internal stimulus is related to one's thought, feeling, or biological needs, and an external stimulus is about stressors. Trait anxiety and both external and internal stimuli have a direct effect on cognitive appraisal in the CSMA. Cognitive appraisal has a direct effect on state anxiety, defense mechanism, and behavior. In addition, state anxiety directly affects defense mechanism and behavior and has a feedback effect on internal stimuli. Also, defense mechanism directly affects behavior and has a feedback effect on cognitive appraisal in the CSMA.

State anxiety is the temporary dimension of anxiety related to stress responses in the CSMA (Spielberger, 1983), a feeling of uneasiness with psychological signs of the autonomic nervous system in response to a vague and nonspecific stress (Boudarene, et al., 2002). Stress, according to Selye (1984), is a form of noxious stimulus from human life stress events that causes general adaptation syndrome responses. In the stress-coping process theory (Lazarus & Folkman, 1984), state anxiety is one of the response symptoms from stress appraisal, such that a person perceives stimulus as harm, loss, threat or challenge. This is a cognitive process and might be beneficial to an individual. However, higher state anxiety usually causes an individual to be uncomfortable and have trouble with routine life schedule.

By contrast, trait anxiety is the character dimension of anxiety related to a long-term stable condition of one's personality in CSMA (Spielberger, 1983). Trait anxiety can be characteristic of an anxiety disorder and may be due to unbalanced brain neurotransmitters (McLean & Woody, 2001). Based on one's background or one's particular biological responses, trait anxiety differs from one individual to the next.

In the dynamic relationships between state and trait anxiety in the CSMA (Spielberger, 1966), state anxiety is a cognitive phenomena. State anxiety is the emotional product resulting from internal stimuli, external stimuli, and trait anxiety through the cognitive appraisal process. State anxiety has direct effect on behavior and indirect effect through defense mechanism on behavior outcome. Trait anxiety is independent from stimuli (Spielberger, 1966, 1972, 1983) and has an indirect effect on

behavior outcome through one's cognitive appraisal in the CSMA. Trait anxiety is highly correlated to state anxiety in general (Spielberger, 1983).

A key limitation of the distinction between state and trait anxiety is that they may not have their bases purely in symptoms of anxiety. One general criterion used to identify the difference between state and trait anxiety is the duration of anxiety symptoms. However, the duration of anxiety symptoms might be individually different from person to person and from one stress event to another. Moreover, it is difficult to find the clear cutoff point of duration to apply the principle, and there can be bias in measuring trait anxiety at one point of time when someone suffers a serious crisis. In sum, the researchers need to aware that the distinction between state and trait anxiety is too vague to apply a realistic and precise measurement of anxiety.

Eleven Determinants of Physical Activity in the PAPA Model

This investigator uses four personal factors and six cognition-emotion factors to predict physical activity as a behavioral outcome in the PAPA model. Personal factors (gender, educational level, income adequacy, and trait anxiety) have an influence on the level of physical activity directly and indirectly through seven cognition-emotion variables. In turn, the seven cognition-emotion variables (perceived life stress events, state anxiety, perceived benefits of activity, perceived barriers to activity, perceived self-efficacy for activity, perceived family members' and friends' support for activity) have a direct influence on the level of physical activity in the model.

Personal Factors

The personal factors include gender, educational level, income adequacy, and trait anxiety. Based on Pender's revised HPM (Pender, et al., 2002), personal factors affect a person's engaging in physical activity directly and indirectly through cognition processes. The relationships of each personal factor to physical activity and cognition-emotion variables are described below.

Gender

The empirical data showing that gender influences physical activity is widespread in the literature. First, gender directly impacts an individual's choice of the types of regular physical activity. For example, walking and aerobics are more common types of regular activity for women, and yard work, strengthening exercises, and jogging are more common for men (USDHHS, 1996). Second, there are gender differences in engaging in physical activity (Booth, 2000; Trost, Owen, Bauman, Sallis & Brown, 2002; Yancey, et al., 2004). For example, males reported engaging in regular physical significantly higher than females in a cross-sectional design study among 187 college students (Sale, Guppy & El-Sayed, 2000). For Chinese young adults, men were more likely to engage in physical activity than women ($F=7.43$, $P<0.001$) among 309 undergraduate students (Davis & Katzman, 1998). In addition, gender was a significant predictor of physical activity in many research models (Belza & Warms, 2004; Sallis, et al., 1986).

Gender also produces differences in cognition-emotion variables that influence physical activity indirectly. For example, gender resulted in different perceived barriers

to activity in a summary of 4 focus group sessions with low-income adults (Clark, 1999). Perceived self-efficacy was associated with better exercise adherence for women in a correlation study with 27 adult men and 32 adult women (Vandeventer, 1996). Social support had significant effect on physical activity for 184 women, but not for 154 men randomly assigned in an experimental intervention study (Sallis, et al., 1999). In addition, concerning emotional concepts in the PAPA model, women perceived higher life stress than men among young adults (Menna, 1995); women reported higher levels of anxiety than men (Barsky, et al., 2001; Fuentes & Cox, 2000; Tekin, 2002); and among 600 Taiwanese adults, women reported more psychological symptoms than men (Lu, 1995).

But gender does not explain all the differences in physical activity performance and cognitive variables in many of the research findings. For example, gender did not result in a significant difference in physical activity among 137 adults in a study by Stutts (1997). In addition, gender was not significantly different in the benefits of activity and barriers to activity for adults (Miller, Ogletree & Welshimer, 2002; Stuff, 1997). Although gender was involved as an important role in personal factors in many study frameworks, gender did not differ significantly when comparing goodness of fit for a model that predicted physical activity among 304 adults (Mason-Hawkes, 1990). The results were similar for people with mental illness, in that gender was not a significant predictor of health-promoting behaviors including physical activity for 100 adults with mental disorders (Rogers, 2001).

In the pilot study of this research, gender was not significantly different in physical activity performance among 19 Taiwanese adults with anxiety (Ma, 2005; Ma, Laffrey, Chen, & Wu, 2005). But, gender differed in perceived barriers to activity ($t = 2.356$, $p < .05$) and perceived self-efficacy for activity ($t = 2.360$, $p < 0.05$) among population with anxiety (Ma, 2005; Ma, Laffrey, Chen, & Wu, 2005). Due to lower power in the pilot study because of small sample size, the research study requires a larger sample to further examine differences between male and female participants in cognition variables and physical activity performance for the population with anxiety in Taiwan.

Educational level

Many studies reported that educational level had a direct effect on physical activity. Higher levels of education were associated with higher levels of participation in exercise programs for younger adults (Dishman, 1988; Dowda, et al., 2003; King et al., 1992). In addition, higher educational levels indicated higher physical activity prevalence in surveys with 40,261 adults (Hawkins, Cockburn, Hamilton & Mack, 2004) and in another study with 409 adults from 20 to 73 years old (Miller, et al., 2002). Droomer's research, including 2,598 men and women, reported that lower educational levels were correlated to physical inactivity (Droomer, Schrijvers, van de Mheen & Mackenbach, 1998). In research findings reported by Brownson, Salmon, Trost and their colleagues, education level was also a significant predictor of physical activity participation (Salmon et al., 2000; Trost et al., 2002), and Rogers reported similar findings for adults with mental disorders (Rogers, 2001).

Education level also affected physical activity participation indirectly through correlation with some cognition-emotion variables as proposed in the PAPA model. For example, in a study by Mosse and Anderson (2003), the interaction of ethnicity, education, and income was significantly correlated to perceived barriers to activity among 246 African American and Hispanic women 40 to 70 years of age. In another epidemiological study, Thoits found that adults with less education perceived significantly more distress by the experience of life events ($t = -.40$, $p < .05$) than did adults with higher educational levels (Thoits, 1982).

Conversely, education level was found to have no correlations with physical activity and most of the cognition-emotion variables in the PAPA model in many reports. Education level was not significantly correlated to physical activity in a correlation study among 137 American adults (Stutts, 1997), nor was educational level correlated to cognitive variables in the PAPA model. For example, Stutts reported that educational level was not significantly correlated to perceived benefits of activity, perceived barriers to activity, self-efficacy for activity and social support for activity among 137 American adults (Stutts, 1997). Pakapong reported that educational level did not have either a direct effect on physical activity or an indirect effect through cognitive variables on physical activity for an adult population in U.S. (Pakapong, 2003). For emotional variables in the PAPA model, Spano reported that educational level was not significantly associated with state anxiety among 210 adults with anxiety disorders (Spano, 1998).

Although education level has been examined in its relationships with physical activity and cognitive concepts in many studies, the results show inconsistent outcomes in

their findings for general populations. The pilot study of this research tried to understand the relationships of education levels to physical activity and cognition-emotion variables in the PAPA model. The results showed that educational level was not significantly correlated to physical activity performance or other cognition-emotion variables proposed in the PAPA model among 19 Taiwanese adults with anxiety (Ma, 2005; Ma, Laffrey, Chen, & Wu, 2005). Increasing the sample size may enable better examination of the relationships of educational levels to physical activity performance and cognition-emotion variables for the study population with anxiety.

Income Adequacy

Income adequacy has a great effect on physical activity participation among adults. People with better income adequacy status seem more likely to engage in regular physical activity. Several studies have found that income adequacy influenced adults engaging in leisure-time physical activity (Schoenborn, 1989; Stephens, Jacobs & White, 1985). In addition, many research findings showed that participant's lower income status was correlated to inactivity. For example, one study reported that participants with lower income was associated with higher physical inactivity performance than was participants with higher income status among 4,661 American adults (Phillips, Arber & Ginn, 2001). Higher income participants were twice more likely than those with lower income to meet physical activity recommendations among 1,818 adults (Parks, Housemann & Brownson, 2003). Similar results in a study with 8,353 adults in Los Angeles County showed a 52% sedentary rate among those with incomes <100% of

federal poverty level and a 32% sedentary rate for those with incomes at ≥300% of federal poverty level (Yancey et al., 2004). In addition, job category, described as blue-collar or white-collar status, was found to be a significant predictor of physical activity (Desmond, Conrad, Montgomery & Simon, 1993). The data showed that people with white-collar jobs had greater physical activity participation than whose with blue-collar jobs. Income was also a significant predictor of increased physical activity in one study involving 198 adult females (Nies & Kershaw, 2002).

Still other studies have reported that income adequacy also affected physical activity indirectly through correlation with cognitive and emotional concepts. For example, women with middle-income significantly perceived more benefits of activity ($F= 8.96$, $p< .01$) and perceived less barriers to physical activity ($F= 21.72$, $p< .001$) than women with lower-income among 116 adult females (Hall, 1998). Cairney reported that better income adequacy status was related to lower perceived life stress and psychological symptoms (Cairney, 2002). Furthermore, among 140 family caregivers of dementia patients as compared with 111 non-caregiving control participants, subjects with lower income tended to drink more alcohol when they experienced higher stress from life events (Redinbaugh, 1997) indicating individuals with lower income intended not to use physical activity as a coping behavior to deal with their stresses.

No data were found to support how income adequacy affects physical activity or other cognitive variables for adults with anxiety in Taiwan, but Chen (1995) reported that income adequacy is correlated with many cognitive variables for Taiwanese elders. Some of these variables include benefits of activity, barriers to activity, and social

support for activity. In another study by Wasawachaisuwikrom (2001), income level significantly predicted increased physical activity both directly and indirectly through cognition-emotion concepts for Thai elders.

To better understand the role of income adequacy in physical activity performance for adults with anxiety in Taiwan, the pilot study examined the relationships of income adequacy to physical activity and cognition-emotion variables. The results showed no significant differences in physical activity performance and other concepts proposed in the PAPA model between adequate income and inadequate income among 19 Taiwanese adults with anxiety (Ma, 2005; Ma, Laffrey, Chen, & Wu, 2005). However, the outcomes of the pilot study may be unstable because of small sample size, and having more participants involved in the future study may yield clarification of the relationships that exist between income adequacy and physical activity and other cognition-emotion concepts among Taiwanese adults with anxiety.

Trait anxiety

Trait anxiety is one of the personal factors in this study. Trait anxiety, the personality dimension of anxiety described broadly in the cross-sectional model of anxiety, can contribute to personal factors, and several studies have reported that physical activity can reduce trait anxiety for adults (Glenister, 1996; Martinsen, 1993; Petruzello et al., 1991; Plante, 1996; Tucker, 1990).

Trait anxiety may have a direct effect on physical activity participation. In studies by Spanos (1998, 2001), the results demonstrated that high levels of trait anxiety

or obsessive-compulsive-type disorders were positively correlated with a diminished commitment to regular physical activity among 210 adults aged 18 to 78 years.

Most studies focused on trait anxiety as a dependent variable with physical activity as an independent variable. Studies that conceptualized trait anxiety as an independent variable influencing physical activity as an outcome variable are seldom found in the literature. More specifically, few studies were found to provide information about trait anxiety influencing physical activity through cognitive and emotional concepts like those proposed in the PAPA model. According to Speilberger's CSMA model (1996), trait anxiety has an indirect effect on behavior through cognitive appraisal. Consistent with the CSMA model, Wang and Liu (2000) found that trait anxiety was negatively and significantly correlated to lower general self-efficacy ($r = -.30$, $p < .01$) among 401 Asian college students. In addition, trait anxiety was highly positively correlated to increase state anxiety among 1,838 working adults ($r = .75$ for males and $r = .70$ for females) and 855 college students ($r = .65$ for males and $r = .59$ for females) (Spielberger, 1983). Further research is needed to clarify the phenomenon of physical activity in a population with anxiety and the relationships between trait anxiety and other cognitive, emotional concepts related to physical activity.

In the pilot study of this research, trait anxiety was positively correlated to state anxiety ($r = .55$, $p < .05$) and negatively correlated to family members' support for activity ($r = -.45$, $p < .05$) among 19 Taiwanese adults with anxiety (Ma, 2005; Ma, Laffrey, Chen, & Wu, 2005). For this aspect of the study, the pilot study again revealed that more

participants are needed to examine adequately the relationships between trait anxiety and other variables in the PAPA model.

Summary of Personal Factors

The relationships among gender, educational levels, income adequacy, and trait anxiety with physical activity are diverse in the literature. Many studies report gender differences in people's engaging in physical activity, with men preferring greater physical activity. Other studies demonstrate that gender is not significantly related to cognitive and emotional concepts among adults. One reason for different outcomes may be different characteristics of the population used in the study.

For 19 Taiwanese adults with anxiety in the pilot study for this research, perceived barriers to activity and perceived self-efficacy for activity were not significantly different based on gender. The role of gender in a person's engaging in physical activity performance is complicated and needs also to consider other factors that influence physical activity performance. The small sample size of the pilot study limits the ability to make significant conclusions.

Higher educational levels and better income adequacy status are positively correlated with increases in people's engaging in physical activity participation in general. However, in the pilot for this study, education was not a factor that affected people with anxiety engaging in physical activity performance and was not correlated with other cognition-emotion variables. Income adequacy, too, showed no significant differences in engaging in physical activity and other variables in PAPA model pilot-

tested among 19 Taiwanese adults with anxiety. The small sample size likely influenced these findings as well.

Seldom has any study focused on whether trait anxiety influences physical activity. Although trait anxiety was positively correlated to state anxiety and negatively correlated with family members' support for activity in the pilot study of this research, trait anxiety and its relationships with cognition-emotion concepts also are not significant, again possibly because of small sample size. The future study may have different findings due to the increased statistical power that occurs with a larger number of participants.

Cognition-Emotion

The construct of cognition-emotion includes seven concepts: perceived life stress events, state anxiety, perceived benefits of physical activity, perceived barriers to physical activity, perceived self-efficacy for physical activity, perceived family members' and friends' support for activity. Each of these concepts is described below.

Perceived Life Stress Events

The variable of perceived life stress events is related to individuals' feelings about how stressful their responses are to their recent life stress events. Perceived life stress events have great influence on physical activity. One study focused on life events stress and levels of inactivity among 7,281 young adult women (Brown & Trost, 2003). The

results found that three life events: getting married, having a first or subsequent child, and beginning paid work, were strongly associated with lower levels of physical activity.

Another study by Johnson-Lozlow and colleagues examined the effect of life stress on physical activity among 184 women and 154 men (Johnson-Kozlow, Sallis & Calfas, 2004). The results showed that higher life stress was related to greater physical activity participation in the intervention group ($F = 6.03$, $P < .05$). The intervention was focused on improving self-efficacy, social support and perceived benefits, decreasing barriers to activity, and instruction in the documented value of physical activity as an effective stress management technique. The study implied that high stress might sustain physical activity participation, because physical activity was a better way to help participants deal with their life stress (Johnson-Kozlow, 2004). In another study of 32,229 employed adults, perceived lower life stress was associated with moderate amounts of physical activity (Aldana, Sutton, Jacobson & Quirk, 1996).

From Spielberger's CSMA (1966), life stress events are postulated to have a direct effect on state anxiety and an indirect effect on behavior through state anxiety. Perceived life stress events should be highly correlated to state anxiety because state anxiety, by definition, is the response to stress from life events. In general, the more life stress events perceived, the higher one's anxiety (Sherbourne, 1988). This statement is also applicable to people with mental illness. In a study by Pancheri and colleagues (1985), higher life stress events were associated with higher state and trait anxiety for people with psychiatric and psychosomatic diseases.

Perceived life stress events may be associated with other cognitive variables.

For example, among a group of nursing college students surveyed by Cheng & Wang (1999), higher perceived life stress events were associated with lower perceived social support ($r=-.25$, $p< .01$). But, in the pilot study of this research among 19 Taiwanese adults with anxiety, perceived life stress events was not significantly correlated to physical activity performance or any other variables in the PAPA model (Ma, 2005; Ma, Laffrey, Chen, & Wu, 2005). A larger number of participants involved in the full study may produce different outcomes.

State Anxiety

State anxiety is the response to life stress events, and it is described in Spielberger's CSMA (1996). Many studies have shown that higher physical activity performance results in lower state anxiety (Breus & O'Connor, 1998; DiLorenzo et al., 1999; Morgan & Horstman, 1976; Breus & O'Connor, 1998; DiLorenzo et al., 1999; Wood, 1977). As with trait anxiety, most of the studies focus on state anxiety as an outcome variable, with physical activity performance as an independent variable. Studies examining state anxiety as an independent variable influencing physical activity as an outcome variable have seldom been reported in the literature.

People with state anxiety may have lower physical activity performance, because they face problems or stresses in their lives. Because they are dealing with stresses, people with a high level of state anxiety may not have available time or appropriate emotional states to do physical activity. One study supporting this statement showed that state anxiety effects on physical activity among adults focused on fatigue and

physical activity (Chen, 1986). Chen's results indicated that state anxiety was highly positively associated with increased fatigue, and higher fatigue was positively significantly correlated to lower physical inactivity. This result implies that state anxiety is negatively correlated to lower physical activity participation.

Conversely, people with higher state anxiety may have higher levels of physical activity participation, because higher state anxiety indicates higher life stress that may increase physical activity participation as a coping behavior. These differing results need more study in order to understand more completely the relationships between state anxiety and physical activity.

In the pilot study of this research involving 19 Taiwanese adults with anxiety, state anxiety was not correlated to physical activity performance, but was positively correlated to trait anxiety ($r = .55$, $P < .05$) and negatively correlated to perceived self-efficacy for activity ($r = -.58$, $P < .01$) (Ma, 2005; Ma, Laffrey, Chen, & Wu, 2005). The phenomenon of the relationship between state anxiety and physical activity is not clear and needs more study with a larger number of participants.

Perceived Benefits of Physical Activity

The perceived benefits of physical activity are related to positive personal experiences of physical activity participation. Empirical studies offer considerable data to support that regular physical activity has great benefits to health. For example, regular physical activity reduces the risk of cardiovascular diseases (Berlin & Colditz, 1990; Gordon, Scott, Wilkinson, Duncan & Blair, 1990; USDHHS, 1996; Fransson,

Alfredsson, de Faire, Knutsson & Westerholm, 2003), hypertension (Arroll & Beaglehole, 1992a; Arroll & Beaglehole, 1992b; Elley & Arroll 2002; Gordon, et al., 1990), diabetes (Bouchard, Shephard & Stephens, 1994), colon cancer (USDHHS, 1996), and obesity (Bouchard, et al., 1994). All of these diseases are leading causes of death in Taiwan (The Department of Health, 2003).

Physical activity also has been shown to have short and long term beneficial effects on psychological outcomes and emotional functioning. In short-term benefits, acute physical activity increases positive mood, decreases tension, fatigue, anger and worry, and enhances overall psychological health for adults (Blumenthal, William, Needels & Wallace, 1982; Berger & Owen, 1998). Nervousness, worry and state anxiety decreased immediately after aerobic physical activity in a study with 177 adult males and 38 females (Morgan & Horstman, 1976). The results were similar for 82 adults after a 12-week aerobic fitness program (DiLorenzo et al., 1999), and for college freshmen after running 12 minutes (Wood, 1977). Breus and O'Connor (1998) designed an experimental study. They found that anxiety was reduced following physical activity, and that the activity provided people with time out from daily worries.

The long-term benefits related to physical activity are similar to short-term benefits. In a study by Long and Haney (1988), stressed working women were separated into an 8-week walk/jog aerobic physical activity group and a progressive relaxation group, with each group having a 14-week follow-up. The results showed that anxiety decreased continually during the 14-month follow up period in both groups. In another intervention study, 82 participants in a 12-week aerobic fitness program had

physiological and psychological improvements that remained for 12 months, while 29 participants in the control group had short-term benefits, but did not have similar long-term outcomes (DiLorenzo et al., 1999).

Some studies show that physical activity is not only beneficial for the general population, but also has many potential psychological benefits for people with mental illness. In a study by Martinsen (1993), people with anxiety disorders reported decreased anxiety following an 8-week aerobic exercise inpatient treatment program. Since physical activity may stabilize a human's nervous system action (Berger, 1984); impact minor changes in β-endorphins; which enhance positive mood (Goldfarb, Hatfield, Potts & Armstrong, 1991); affect the action of the endogenous system (Hoffmann, 1997); and change norepinephrine levels (Petruzello et al., 1991), more and more health care providers suggest regular physical activity as an appropriate treatment to improve physical and psychological abilities for the general population, as well as for people with mental illness (Glenister, 1996; Plante, 1996; Tucker, 1990).

Because physical activity has benefits for health, many studies show that the variable of perceived benefits of activity influences individuals to engage in physical activity. For example, a quasi-experimental study of 44 Hispanic and African American people by D'Alonzo and colleagues, showed the overall perceived benefits of physical activity were different ($F = 5.12$, $P < .01$) based upon physical activity program participation (D'Alonzo, Stevenson, & Davis, 2004). Another study of 125 college women by Barrows (2003) showed that physical activity participation was positively correlated with higher perceived psychological benefits from activities ($r = .224$, $P < .05$);

a greater sense of well being from activities (r= .255, P< .01); the absence of emotion when exercising (r = .232, P< .01); a positive impression of physical status (r= .22, P< .05); and feelings of relaxation after activities (r= .21, P<. 05). Hall's study also indicated that women perceived higher benefits were significantly correlated with higher physical activity level (r= .23, p< .01) among 116 adults (Hall, 1998). In contrast, the variable of perceived benefits of activity was not always significantly correlated to physical activity in other studies in a general population. For example, in a study involving 135 adults by Stutts (1997), perceived benefits of activity was not significantly positively correlated to physical activity.

Though there are reports of perceived benefits of activity significantly positively correlated to physical activity (r=0.31, P<0.01) for adolescents (Wu, 1999) and for elders (r=0.63, P<0.01) in Taiwan (Chen, 1995), few studies report data concerning the relationship between perceived benefits of activity and physical activity participation for adults with anxiety. In the pilot study of this research, perceived benefits of activity were highly correlated to increased physical activity participation (r= .70, P< .001) among 19 Taiwanese adults with anxiety (Ma, 2005; Ma, Laffrey, Chen, & Wu, 2005). The variable of perceived benefits of activity also plays a key role in physical activity participation for Taiwanese adults with anxiety.

Perceived Barriers to Physical Activity

Perceived barriers to activity include unavailability, inconvenience, expense, and the time-consuming nature of health-promoting behavior (Pender et al., 2002). The

barriers to physical activity for adults include lack of time/insufficient time, work or study, care responsibilities for children or elders, lack of access to convenient facilities, and lack of motivation (Booth, Bauman, Owen & Gore, 1997; USDHHS, 2001; Zunft et al., 1999). Lacking a safe environment is also a major barrier for women to engage in regular physical activity (Nies, et al., 1999; USDHHS, 2001).

Many studies reveal that barriers to physical activity often powerfully impact people's engaging in physical activity (Chen, 1995; Mitchell & Olds, 1999). Steinhardt and Dishman (1989) suggested that barriers, such as time, effort, obstacles, and limiting health, significantly explained variances in habitual physical exercise. In addition, perceived barriers to activity was a significant negative predictor of physical activity among 251 adults (Mitchell & Olds, 1999). In addition, Barrows found that physical activity participation was correlated to perceived barriers to activity, such as lack of time ($r = .39$, $P < .01$) and firedness after doing activities ($r = .29$, $P < .01$), among 125 college women (Barrows, 2003).

For people in Taiwan, few studies report data related to the correlation between perceived barriers to activity and physical activity for adults with anxiety, but perceived barriers to activity was the most important factors that influence an adolescent's engaging in physical activity (Tsai, 1996). Barriers included doing homework, not feeling well, lack of time, and parent disapproval (Tsai, 1996). The results are similar to a study by Wu and Pender (2002) that showed perceived barriers to activity was negatively correlated to physical activity for adolescents ($r=-0.26$, $P<0.01$) and for elders ($r=-0.57$, $P<0.01$) in Taiwan (Chen, 1995). In the pilot study of this research, perceived barriers

to activity was not significantly correlated to physical activity among 19 Taiwanese adults with anxiety (Ma, 2005; Ma, Laffrey, Chen, & Wu, 2005). Having a larger number of participants included in the future study may produce different results.

Perceived Self-Efficacy for Physical Activity

Perceived self-efficacy for physical activity is one's confidence in the ability to engage in physical activity, and many research findings show it has a most powerful influence on physical activity (Dishman, 1988; King et al., 1992). For example, in a study by Weitzel (1989), perceived self-efficacy for activity was the most powerful predictor of health-promoting behaviors for adults, and it was one of the most common factors influencing physical activity behavior in another study of adults (Lewis, Marcus, Pate & Dunn, 2002).

Perceived self-efficacy was the most important cognitive key-factor that correlated to physical activity in adults. The perceived self-efficacy for activity was the most significantly correlated variable to physical activity ($r= 0.22$, $P< .01$) for 137 American adults in a correlation study (Stutts, 2002), and for 409 American adults ($r= 0.56$, $P< .01$) in survey research conducted by Miller and colleagues (Miller, et al., 2002). Perceived self-efficacy was the best predictor of physical activity in one research study that included 1,237 undergraduate students (McDaniel, 1999). In another study with 240 adult females (Sargent, 2001), perceived self-efficacy accounted for 25% of the variance in the amount of physical activity.

For a population with anxiety in Taiwan, perceived self-efficacy for activity was a significant predictor of physical activity for 400 workers (Kao & Huang, 2000). In addition, perceived self-efficacy had a strong relationship with physical activity for a study population of adolescents ($r= 0.46$, $P< .01$) (Wu & Pender, 2002) and for elders ($r= 0.63$, $p< .01$). Perceived self-efficacy for activity also has great influence on people with anxiety engaging in physical activity. In the pilot study of this research, perceived self-efficacy for activity was significantly correlated to physical activity performance ($r= .53$, $P< .05$) among 19 Taiwanese adults with anxiety (Ma, 2005; Ma, Laffrey, Chen, & Wu, 2005).

Perceived Family Members' and Friends' Support for Activity

Perceived social support is defined as "the cognitive appraisal of being reliably connected to others" (Stewart, 1993, p.11) and directly impacts physical activity participation (Dowda et al., 2003). Perceived social support for activity is a psychosocial factor influencing physical activity behavior (Lewis, et al., 2002) and is positively correlated with physical activity for adults in many studies, especially for women (Nies, et al., 1999; Sallis, Hovell & Hofstetter, 1992; Sallis & Owen, 1999; Sherwood & Jeffery, 2000; Steptoe, Rink & Kerry 2000). Because social support has great influence on physical activity, it is one factor that has been suggested by the United States Department of Health and Human Services (USDHHS, 2001) to promote physical activity. In addition, social support has been suggested as an important aspect of

interventions aimed at increasing physical activity in a population of sedentary women (Eyler, et al., 1999).

Many research findings support that perceived social support has great influence on physical activity among adults. Studies conducted by King and Sallis indicated that supports from family members and friends were strongly associated with physical activity maintenance (King, et al., 1992; Sallis, et al., 1986). In a study by Hancher (2000), social support was supported as an influencing variable by finding a significant difference ($t= 5.36$, $p< .001$) between adults with and without an exercising spouse. In addition, data collected from 1,557 adults showed that perceived social support was significantly correlated ($r= .23$, $P< .001$) with increased physical activity (Courneya, Plotnikoff, Hotz & Birkett, 2000). This result is similar to the study by Giles-Corti and Donovan (2002), in which perceived social support for activity was a determinant of higher physical activity for 1,803 healthy workers.

Perceived social support for activity not only affects general population engaging in physical activity, but also influences adults with anxiety to engage in physical activity. In the pilot study of this research, perceived friends' support for activity was significantly correlated to physical activity performance ($r= .48$, $P< .05$) among 19 Taiwanese adults with anxiety (Ma, 2005; Ma, Laffrey, Chen, & Wu, 2005).

Summary of Cognition-Emotion Variables

Generally, many research findings support the cognition-emotion variables affecting physical activity participation directly, although some cognition-emotion

variables have ambiguous outcomes in the literature. In the PAPA model of this research, the literature shows that the six variables used for the construct of cognition-emotion have relationships with physical activity.

First, perceived life stress events impact an individual's psychological and physical status. Higher perceived life stress events may indicate higher state anxiety and lower physical activity. Second, state anxiety is negatively correlated to physical activity, but it was seldom investigated as a factor influencing physical activity in a population with anxiety. Third, perceived benefits of activity have a positive correlation with physical activity, and perceived barriers to activity show a negative influence on regular physical activity. Fourth, perceived self-efficacy for activity is a powerful positive predictor of physical activity. Finally, perceived family members and friends' support for activity has a significant positive influence on regular participation in physical activity, especially for women. In addition, Parent and Fortin (2000) reported that social support for a population with illnesses also had an important role in treatment and caring.

These constructs and concepts have been well documented in the literature; however, there is little data for adults with anxiety in Taiwan. The pilot study of this research took the first step to explore the relationships of these six concepts to physical activity among Taiwanese adults with anxiety. The findings showed that perceived benefits of activity, perceived self-efficacy for activity, and perceived friends' support for activity were significantly correlated to physical activity participation for 19 Taiwanese adults with anxiety. Though these findings were shown in the pilot study, interpretation

of these results is limited by the small sample size. Having more participants involved in the future study may result in different findings.

Behavioral Outcome of Physical Activity

Physical activity is the behavioral outcome in the PAPA model used in this research. The concept of physical activity in nursing research literature is a popular subject beginning from 1990 to the present. Prior to that time, the topic of "exercise," as opposed to "physical activity," was more frequently discussed in the nursing literature (Speck, 2002). After 1990, discussions were not limited to just exercise. This research focuses on physical activity that includes physical exercise. The general description of physical activity and the cultural differences for people in Taiwan that engage in physical activity are described below.

The Description of Physical Activity

The concept of physical activity has been explored in the nursing discipline for different populations or fields, and the outcomes depend on the prescription of physical activity (Morgan, 1997). Since 1995, the United States Centers for Disease Control and Prevention (CDC) has suggested that all individuals need to accumulate a minimum of 30 minutes of physical activity on most days to achieve disease prevention and health promotion (USDHHS, 2001). Physical activity is a health-promoting behavior and is increasingly recognized as important in human life.

The most popular definition of physical activity is "any bodily movement produced by skeletal muscles that results in energy expenditure, and the energy expenditure can be measured in kilocalories" (Caspersen, et al., 1985, p.126). In addition, some studies also provide definitions related to physical activity. One by Roy (1991) states that activity refers to, "body movement and serves various purposes, such as carrying out daily living chores and protecting self or others from bodily injuries (p.118)". Another is by NANDA in which activity is defined as, "to change the place or position of a body or any member of the body (p.70)" (Kerr, et al., 1992). Sallis & Owen (1999) say physical activity is, "any bodily movement, referring to the movements of large muscles, such as arms and legs, because these kinds of activities are most closely associated with health outcomes (p.10)".

From the above definitions, physical activity includes: (1) change of position by bodily movement, (2) patterns of activities, (3) energy expenditure of actions, (4) purposes of activity, (5) activity performance that can be measured objectively and subjectively, and (6) activity that can be changed or encouraged by determinants. No matter which of these concepts of physical activity researchers analyze, differing cultures or ethnic groups may have great influence on the results of a physical activity study.

The Culture Differences in Physical Activity

The lifestyle of people in Taiwan has been described as sedentary (Wu, Ronis, Pender & Jwo, 2002). Lee and colleagues (1995) conducted a large epidemiological study that randomly selected 2,565 adults aged 18 or older living throughout Taiwan.

The results indicated that about 41% (N=1052) did not engage in exercise at all, and 51% (N=377) engaged in physical activity regularly. Huang and colleagues (1991) conducted an epidemiological study about lifestyles among 961 individuals, aged 40 to 65, in Taipei County, Taiwan. The results indicated that 47% of adult males (N=281) and 54% of adult females (N=194) never exercise, and only 37% of adult males (N=220) and 31% of adult females (N=113) regularly engaged in physical activity for 20 minutes at least three times a week.

The data become worse for adult employees. A survey by Tong (1991) points out that 75.8% of the adult employees at a Taiwan Power Company lacked adequate physical activity. Only 18.4% of the adult employees at Shihlin Electric & Engineering Corporation engaged in physical activity regularly, based on the USDHHS criterion (1996) of three times per week, more than 20 minutes each time (Chen, 1993). Kao and Huang (2000) also reported 35.3% workers never performed any type of exercise, and only 29.0% of 400 adults participated in exercise more than 90 minutes each week during a 3 month's period. This situation was true not only for the general adult population, but also among health care providers. In a study investigating 900 nurses at a medical center in Taipei, only 14% reported regular physical activity (Wu, 1997). The situation remained the same among young people and elders. Fifty percent of adults aged 40 or older and more than 75% of younger people under 20 were not physically active in Taiwan (Huang, et al., 1991).

The culture in Taiwan has a significant impact on attitudes about physical activity. Physical activity, "Shen Ti Huo Dong" (身體活動 in Chinese), means body movement

for daily life. People in Taiwan have positive beliefs that physical activity promotes harmony between mind and body, and that engaging in physical activity has benefits to health. These beliefs include emphasizing the balance between mind and whole body (Ma, 1999); emphasizing integration of human actions and the environment in the natural world from Taoism's philosophy (Fernando, 2002; MacLachlan, 1997); believing the basic component of the human body is Qi (氣, in Chinese), known as vital energy or vital breath (Fernando, 2002; Wu, 1982); and living well is to have Qi in every part of one's body. These beliefs also influence the types of physical activity chosen by people in Taiwan, such as Tai Chi, because of slow, graceful, and relaxing healthy activity (Ma, 1999). People also believe that Tai Chi promotes circulation of blood and nourishment of all body parts (Tsai, et al., 2004).

However, a strong belief about the importance of academic achievement is a major barrier to regular physical activity. More than half of the population in Taiwan does not engage in regular physical activity. This is especially true for students and young adults (Chen, 1993; Tong, 1991; Wu, 1997). A study by Hui (2002) provided information about 169 undergraduate nursing students. They had the worst performance in physical activity, because academic achievement was considered more important than physical activity. Even though study subjects believed that physical activity had benefits for health, the nursing students in the study did not consider the lack of physical activity to be an immediate threat to their health (Hui, 2002).

Moreover, limited living space and advances in modern technology limit the area and need for physical activity, and this also tends to make people in Taiwan live and

work without much movement. Lacking physical activity may result in people developing chronic diseases at an earlier age in Taiwan, and lower levels of physical activity may have implications for the population of people with anxiety as well.

Summary of Literature Review

More and more people suffer from anxiety in modern society. Medical treatment and psychological counseling help people deal with their anxiety symptoms and improve their psychological status. In addition, evidence suggests that physical activity may be used in combination with these treatments in order better to help the population with anxiety. Indeed, regular physical activity can decrease anxiety, reduce some risks of diseases, maintain a healthy physical and mental status, and promote physical and psychological well-being. To understand how to encourage an individual to engage in regular physical activity is meaningful as a research topic and as a health care principle that can lead to improved health.

Eleven variables modified from the revised HPM (Pender et al., 2002) and CSMA (Spielberger, 1966) are included in the PAPA model as predictors of physical activity. Gender, educational level, income adequacy, and trait anxiety are personal factors that are ambiguous in their relationships with physical activity for adults in the literature. In general, different gender and income adequacy status may be related to differences in physical activity and other cognition-emotion concepts proposed in the PAPA model. Higher educational levels and better income adequacy are positively correlated to physical activity participation and influence physical activity through cognition-emotion variables.

Life stress events, state anxiety, benefits of activity, barriers to activity, self-efficacy for activity, family members' and friends' support for activity are cognition-emotion variables that this study hypothesizes will impact adults engaging in physical

activity. Some of these variables have research findings to support their influence on physical activity in a general population, but some do not have sufficient data to explain their influence on physical activity. Generally, perceived life stress events, state anxiety, and perceived barriers to activity have negative relationships with physical activity, while perceived benefits of activity, perceived self-efficacy for activity and perceived family members and friends' support for activity have positive relationships with physical activity.

From reviewing the literature, physical activity has been showed as effective to relieve stress and to reduce anxiety in both the general population and among anxious people (Doan, et al., 1995). However, the factors that influence physical activity among adults with anxiety in Taiwan are not available in the current literature. For 19 Taiwanese adults with anxiety in the pilot study of this research, the results only supported two statements. 1) Gender differences existed in perceived barriers to activity and perceived self-efficacy for activity. 2) There were relationships between physical activity and perceived benefits of activity, perceived self-efficacy for activity, and perceived friends' support for activity. Because little research on these subjects exists, and only limited conclusions may be drawn from the pilot study for this research, additional investigation to understand these factors is very important in helping persons with anxiety to engage in regular physical activity that reduces anxiety and improves mental health and well being. More adequate testing of the PAPA model for this population is a necessary next step.

CHAPTER THREE

METHODOLOGY

Chapter three focuses on the research method, including research design, sample, data collection procedures, protection of human subjects, instruments, and statistical analysis of the data. Also the pilot study is described.

Research Design

This research on physical activity used a cross-sectional explanatory design to explain directional relationships of eleven independent variables to physical activity. A cross-sectional explanatory design is suitable for this research because: (1) Although many independent variables are well known, and ample evidence exists to support their correlation with physical activity, this investigator found no studies for populations with anxiety. An explanatory design can inform the background of theoretical relationships among variables for specific phenomena (Knapp, 1998). (2) The PAPA model used in this study was modified from two different models (HPM and CSMA) and has not been previously tested. Explanatory research can explain the pattern of relationships between variables in a model by testing hypotheses (Pedhazur & Schmelkin, 1991). (3) A cross-sectional research design also has the strengths of economy and efficiency (Polit & Hungler, 1995). It is the most convenient and feasible way to satisfy the purposes of the research.

Sample Selection

The sample included non-hospitalized men and women, aged 20 to 60 years, who were receiving care for anxiety in five sites: 1) Hsin-Yuan Counseling Center, Taoyuan County, Taiwan; 2) The Life Improving & Loving Association, Taipei and Taichung City, Taiwan; 3) Chung-Shan Medical University Hospital, psychiatric clinics, Taichung City, Taiwan; 4) China Medical University Hospital, psychiatric clinics, Taichung City, Taiwan; and 5) Cheng Ching Hospital, Psychosomatic clinics, Taichung City, Taiwan. Criteria for participation also included that they were able to verbally communicate and agree to participate in this study. The sample included persons who had been diagnosed with anxiety disorders, adjustment disorders, or neurosis, and also included persons without a diagnoses but who were beening treated for anxiety. Persons with medically diagnosed schizophrenia, mood disorder, impaired cognitive function, or physical disability were excluded from this research. The sample included 252 Taiwanese men and women. Table 3.1 shows the sample by study sites. The characteristics of the participants are presented in chapter four.

The sample size was estimated from the degrees of freedom, εo (the null value of the root-mean-square error of approximation (RMSEA)), εa (the alternative value of RMSEA), and the α level (MacCallum, et al., 1996). Degrees of freedom were calculated as $d = p(p+1)/2 - q$, in which p was the number of manifest variables in the model, and q was the number of distinct parameters to be estimated. For a given p equaling 12 and q equaling 40 in the PAPA model, d was 38. By following the table of minimum sample size in the study of MacCallum and his colleagues, producing a sample

size projected to be approximately 250 with a power of .80 (α = .05; εo = 0.05; εa = 0.05 to 0.08).

Table 3.1: Numbers of Men and Women Participants by Study Site

Sites	Gender		Total
	Male	Female	
Hsin-Yuan Counseling Center	17	15	32
China Medical University Hospital	26	48	74
Cheng Ching Hospital	20	28	48
Chung-Shan Medical University Hospital	6	9	15
Life Improving & Loving Association	30	53	83
Total	99	153	252

Data Collection Procedures

Data were collected after approval was received from the Institutional Review Boards (IRBs) of the data collection sites and from the Departmental Review Committee (DRC) of School of Nursing, University of Texas at Austin, and the IRB at the University of Texas at Austin.

The researcher provided exclusion and inclusion criteria to the chiefs and staff members in the five data collection sites. The staff members informed the researcher when they found potential participants who matched the research criteria. The researcher went to the sites at a pre-arranged time to meet with potential participants in a quiet room to explain the purposes of study, and to describe the rights, benefits and risks

of participation. In addition, the participants were informed that all data were confidential, and they were asked to sign an informed consent document when they agreed to participate in this study. After participants signed the consent form, the researcher gave them a copy of the consent form and a package of questionnaires.

Participants were individually interviewed by the researcher, using the Chinese version of the Past Year Regular Physical Activity Checklist and 7-Day Physical Activity Recall. Then, the researcher explained the remaining questionnaires in the package, and asked participants to complete these by themselves. The researcher remained in the room, in case participants had questions that needed to be answered. Participants were asked to return the completed questionnaires to the researcher after they finished. If participants had any difficulties understanding the questionnaires for any reasons, the researcher explained the items in the questionnaires to participants. Completing the questionnaires took 25 to 60 minutes.

Protection of Human Subjects

The researcher obtained approval from the IRBs of the study sites, the DRC of the University of Texas, School of Nursing, and the IRB of the University of Texas at Austin (Appendix A). Participants were asked to sign an informed consent form (Appendix B) after they agreed to participate in the study. The consent form explained the purposes of the study, the data collection procedures, potential risks and benefits of participation, and the protection of confidentially.

An increase in participants' awareness of the importance of regular physical activity was the major potential benefit to participants for participation. In addition, participating in this study helped to improve participants' insight about factors that impacted physical activity performance.

Two potential risks existed for participants in this study. The first was that participants might feel tired or anxious, because of the 25 to 60 minutes needed to fill out the questionnaires. To avoid this, participants were told that they could rest at anytime, and they were not pressured to complete the questionnaires within a minimum time limit. The second risk related to the content of the questionnaires. Participants might feel uncomfortable about answering some items. To avoid this, the participants were told that they could omit those items that made them feel uncomfortable. The participants also were told that they could withdraw from the study at anytime without explanation. The potential risk for harm to the participants was minimal.

The data were identified on the questionnaires and entered into the research database using code numbers instead of names to protect confidentiality. All information was kept in a locked file cabinet accessible only to the researcher. In addition, all paper documents collected from participants were destroyed when the research was completed. Results and findings of this study were reported as group information, not as individual data.

Instruments

Eight instruments (Appendix D and E) were included in this study with authors' permissions (Appendix C): the Demographic Inventory (DI), the State-Trait Anxiety Inventory form Y (STAI-Y), the Stressful Life Events Checklist (SLE), the Exercise Benefits/Barriers Scale (EBBS), the Exercise Confidence Survey (ECS) and the Social Support and Exercise (SSE), the Past Year Regular Physical Activity Checklist (PYRPA), and the 7-Day Physical Activity Recall (7DPAR). The SLE and PYRPA were modified from existing questionnaires, with some items revised based on Taiwanese cultural background and the specific age range of participants in this study. The STAI-Y, ECS and SSE were translated from English to Chinese by this researcher for the pilot study. The EBBS Chinese version translated by Chen (1995), and the Chinese version of 7DPAR translated by Lin (2000), were used in this research. The variables and instruments are summarized in Table 3.2.

The following section describes the structure, reliability and validity of each instrument. In the pilot study (N=18) for this research, the stability of the instrument was examined by two-week test-retest correlation coefficients. Coefficients were .70 or higher for most of the Chinese versions of instruments. The STAI-Y1 and ECS showed lower test-retest correlation coefficients (.62 and .68, respectively). This may be explained because state anxiety is related to one's current feelings (Spielberger, 1983) and may be easily changed by current life events. ECS is related to perceived self-efficacy, and true change over a 2-week period may influence self-efficacy (Sallis, et al., 1988).

The internal consistency reliability of the instruments was examined using Cronbach's alpha. Most of the Chinese versions of the instruments had alpha coefficients above .70. The SLE and the PYRPA are checklists and the 7DPAR is an interview recall instrument for which testing internal consistency is inappropriate.

Table 3.2: Summary of Variables and Instruments

Variables	Instruments	Resource
Gender	Demographic Inventory	Ma, 2005
Educational level	Demographic Inventory	Ma, 2005
Income adequacy	Demographic Inventory	Ma, 2005
Trait anxiety	State-Trait Anxiety Inventory form Y-2	Translated from Spielberger, 1983
State anxiety	State-Trait Anxiety Inventory form Y-1	Translated from Spielberger, 1983
Perceived life stress events	Stressful Life Events Checklist	Modified from Cheng, 1998
Perceived benefits of activity	Benefits subscale of Exercise Benefits/Barriers Scale	Chen, 1995
Perceived barriers to activity	Barriers subscale of Exercise Benefits/Barriers Scale	Chen, 1995
Perceived self-efficacy for activity	Exercise Confidence Survey	Translated from Sallis, et al., 1988
Family members' support for activity	Social Support and Exercise	Translated from Sallis, et al., 1987
Perceived friends' support for activity	Social Support and Exercise	Translated from Sallis, et al., 1987
Physical activity	Past Year Regular Physical Activity Checklist	Modified from Chen, 1995
	7 Day Physical Activity Recall	Lin, 2000

Most of the original instruments, except the SLE and PYRPA were examined for criterion-related validity by comparison with other instruments. The internal structure validity was examined with factor analysis. The Chinese versions of the instruments

were not tested for criterion-related validity, except for the PYRPA and 7DPAR. Some items in the SLE and PYRPA were revised based on participants' responses in the pilot study. Each instrument is described below.

Demographic Inventory

The Demographic Inventory (DI) was used to record participants' personal data. Eight items from the DI measured: age, gender, martial status, educational level, personal income, income adequacy, types of anxiety disorders, and medicine taking status. Since people in Taiwan tend to provide income information lower than fact, this researcher assumed that asking about actual income would not be adequate. For this reason, one item in DI was used to measure income adequacy: "Do you feel that your income is adequate to meet your needs?" (see Appendix D).

State-Trait Anxiety Inventory Form Y

The State-Trait Anxiety Inventory form Y (STAI-Y) is a self-administered instrument developed by Spielberger (1983) to measure subjective feelings related to anxiety, including state and trait anxiety. State anxiety is defined as "a transitory emotional state or condition," and trait anxiety is defined as "relatively stable individual differences in anxiety proneness" (Spielberger, 1983, p.1). The STAI-Y includes 40 items on a 4-point Likert scale (ranging from 1 = "not at all" to 4 = "very much so") and consists of 20 items to assess state anxiety (Y-1) and 20 items to assess trait anxiety (Y-2). The possible range of scores for the STAI-Y is 40 to 160; higher scores indicate higher

anxiety. The two separate scales have satisfactory reliability and validity (Speilberger, 1983).

The 30-day test-retest correlation coefficients were .84 for trait anxiety and .62 for state anxiety among 424 high school students (Spielberger, 1983). Because state anxiety measures current feeling, a lower test-retest coefficient is acceptable for the STAI-Y1. The alpha coefficients for assessing internal consistency ranged from .86 to .95 for state anxiety and from .89 to .91 for trait anxiety among 1,838 working adults, 1,964 military recruits, 424 high school students, and 855 college students (Spielberger, 1983).

STAI-Y has been used in many studies, and is considered as a gold standard for measuring anxiety. Significant correlation coefficients with the Beck Anxiety Inventory ($r = .52$ for state anxiety, and $r = .44$ for trait anxiety) supported criterion-related validity of the STAI-Y among 217 older adult outpatients with mixed psychiatric disorders (Kabacoff, Segal, Hersen & Van Hasselt, 1997). Four factors yielded eigenvalues of 12.25 (state anxiety present), 3.19 (state anxiety absent), 2.39 (trait anxiety absent), and 1.19 (trait anxiety present) among 1,728 air force recruits (Spielberger, 1983) to support internal structure validity. Spielberger also tested the cross-structure construct validity of the STAI-Y by comparing personality measurements to support convergent and discriminant validity among 206 college students and 66 neuropsychiatric patients (Spielberger, 1983).

The STAI-Y was translated from English to Chinese by this researcher in the pilot study for this research with 18 Taiwanese adults with anxiety. Two-week test-retest

reliability coefficients for the Chinese version of the STAI-Y were .92 for trait anxiety and .63 for state anxiety. For the study population of 252 Taiwanese adults with anxiety, the Cronbach's alpha coefficients were .92 for trait anxiety and .94 for state anxiety. A factor analysis yielded two factors for state anxiety with eigenvalues of 9.78 and 1.61 and two factors for trait anxiety with eigenvalues of 7.95 and 1.86. The results were similar to the outcomes in the study by Spielberger (1983) with 1,728 air force recruits.

Stressful Life Events Check List

The Stressful Life Events Checklist (SLE), revised by this researcher from Cheung's (1998) Pleasant and Stressful Life Events Questionnaire, was used to measure stress response to life events during the past six months. The SLE includes a list of 80 items; each item is on a 9-point scale ranging from 1 = "the least stress" to 9 = "the most stress". Participants marked the items they experienced during the past six months and stated how stressful they currently felt about each marked item. The score for the SLE is the sum of the perceived stressful scores on marked items, with a higher score indicating greater perceived stressful life events.

Cheung's Pleasant and Stressful Life Events Questionnaire included 98 items (Cheung, 1998). During the pilot for this study, a panel of experts (Appendix F) familiar with Taiwanese culture selected a subset of 76 events, based on Taiwan's culture. Four additional life stress events that emerged from participants' responses in the pilot study were also included in the final version of the SLE. They were: pregnancy

status, loss of money in the stock market, read books or watched television about issues related to China, and supported a candidate who lost the political election. In addition, five blank items were provided at the end of the SLE for participants to write in any perceived stress events that were not listed in the instrument.

Since the SLE is different from the original Pleasant and Stressful Life Events Questionnaire, no information related to reliability and validity has been reported, except in the pilot study by this researcher. For the 18 Taiwanese adults with anxiety who participated in the pilot study, the 2-week test-retest reliability correlation coefficient for the SLE was .85. The SLE does not need to demonstrate internal consistency reliability, as it describes situational factors unrelated to personal disposition (Pedhazur & Schmelkin, 1991).

Exercise Benefits/Barriers Scale

The Exercise Benefits/Barriers Scale (EBBS) was developed by Sechrist, Walker, and Pender (1987) to measure an individual's perception of the benefits of exercise and barriers to exercise. The EBBS consists of 29 items that measure the benefits of exercise, and 14 items that measure barriers, using a 4-point, forced-choice, Likert format from 4 ("strongly agree") to 1 ("strongly disagree").

The EBBS may be scored and used in its entirety to measure the overall positive ways an individual perceives exercise, or as two separate subscales to measure benefits of exercise and barriers to exercise. The scores can range from 29 to 116 for the benefits subscale and from 14 to 56 for the barriers subscale (Sechrist, et al., 1987). Higher

scores in the benefits sub-scale indicate an individual perceives higher benefits of exercise. Higher scores in the barriers sub-scale indicate an individual perceives higher barriers to exercise.

Sechrist et al., (1987) tested the EBBS for reliability and validity with 650 adults. The 1 to 2 week test-retest correlation coefficients were .89 for the total scale, .89 for the benefits scale, and .77 for the barriers scale. Cronbach's alpha scores were .95 for the total scale, .95 for the benefits, and .87 for the barriers scale. The EBBS yielded nine factors by factor analysis with an explained variance of 64.9%. Life enhancement (14.97), physical performance (3.27), psychological outlook (2.12), preventive health (1.21), and social interaction (1.35) were five factors with corresponding eigenvalues yielded from the benefits subscale. Exercise milieu (1.54), time expenditure (1.29), physical exertion (1.14), and the lack of family encouragement (1.03) were four factors with corresponding eigenvalues yielded from the barriers subscale (Sechrist, et al., 1987). Although no data were reported that supported criterion-related validity for the EBBS, the EBBS has been used in many studies.

Chen (1995) translated the EBBS from English to Chinese. The three-week test-retest reliability of the Chinese version of the EBBS for Taiwanese elders was .75 for the benefits subscale and .78 for the barriers subscale (Chen, 1995). For the 196 Taiwanese elderly people in Chen's study, the Cronbach's alpha coefficient was .96 for the benefits subscale and .88 for the barriers subscale (Chen, 1995). The Chinese version of the EBBS was examined in a pilot study of 18 Taiwanese adults with anxiety. Two-week test-retest correlation coefficients were .87 for the benefits subscale and .87 for the

barriers subscale. Cronbach's alpha coefficients were .95 for the benefits subscale and .82 for the barriers subscale for the 252 Taiwanese adults with anxiety who participated in the study for this research. Five components with eigenvalues of 12.45, 2.42, 1.58, 1.22 and 1.08 in the benefits scale accounted for 64.63% of the variance. Four components with eigenvalues of 4.25, 2.07, 1.46 and 1.01 in the barriers scale accounted for 62.80% of the variance. The results were similar to the study by Sechrist and her colleagues (1987) with 650 American adults.

Exercise Confidence Survey

Sallis and colleagues developed the Exercise Confidence Survey (ECS) in 1988 to measure self-efficacy for health related exercise behavior. The ECS consists of 12 items with a 5-point scale from 1 ("I know I cannot") to 5 ("I know I can"). Additionally, an optional answer, "does not apply," is available for each item and is coded as missing data. When missing data are found to be fewer than three in a data set, median substitution is used to prevent a falsely low score. But, if three or more missing values are found in one case, that case is dropped from the total data set. The ECS scores may range from 12 to 60, with higher scores indicating higher confidence.

The ECS has been tested for stability, internal consistency, and validity for adults younger than 45 years old (Sallis, et al., 1988). The two-week test-retest correlation coefficient was .68 for 52 adults, and the Cronbach's alpha coefficient was .83 for 171 adults. According to Sallis, et al. (1988), a test-retest correlation coefficient of .68 is acceptable, because self-efficacy may be influenced by many reasons over time.

The criterion-related validity of ECS was supported by a significant correlation with reported participation in vigorous activity (Sallis, et al., 1988). Principal-components factor analysis with 171 adults for the ECS yielded two factors accounting for 69% of the variance. Two factors were "resisting relapse" with an eigenvalue of 9.9 and making time for exercise with an eigenvalue of 2.6 (Sallis, et al., 1988).

The ECS was translated from English to Chinese by this researcher for the pilot study with 18 Taiwanese adults with anxiety. The two-week test-retest correlation coefficient was .73. In the completed research project, the Cronbach's alpha coefficient was .94 for 252 adults with anxiety in Taiwan. A factor analysis yielded two factors with eigenvalues of 5.65 and 2.01 in the pilot study, but only one factor in the research study. The single eigenvalue equaled 7.22, accounting 60.15% for the variance.

Social Support and Exercise Survey

The Social Support and Exercise Survey (SSE) was developed by Sallis and colleagues (1987) to measure family members and friends' support for exercise behavior during the past three months. The SSE consists of 13 items with responses in a 5-point scale from 1 ("none") to 5 ("very often"). Each item has to response twice: support from family (or members of the participant's household) and support from friends. Additionally, an optional answer "does not apply" is available for each item and is coded as missing data.

In the study by Sallis, the scores for family members' support and friends' support are calculated separately. Three items (7, 8, and 9) are not calculated for friends'

support, because they are specific to family members' support (Sallis, et al., 1987). For fewer than three missing values in a data set, median substitution is used to prevent a falsely low score. But, if three or more missing values were found in one case, that case is dropped from the total data set. The possible range of scores for the SSE is from 13 to 65 for family members' support and from 10 to 50 for friends' support. Higher scores indicate greater perceived social support.

The SSE has been tested for stability, internal consistency reliability, and validity with introductory psychology students, undergraduate health psychology students, and staff members in a health-promotion research study (Sallis, et al., 1987). Criterion-related validity of the SSE was supported by significant correlations with a vigorous exercise measure in 171 adults (Sallis, et al., 1987).

A principal-components factor analysis yielded one factor (exercise together) for friends' support with an eigenvalue of 6.3, accounting for 57% of the variance (Sallis, et al., 1987). Two factors emerged for family members' support, accounting for 59% of the variance. One is the factor of participation from family members with an eigenvalue of 7.2 and one is the factor of rewards and punishments from family members with an eigenvalue of 2.1. Test-retest reliability coefficients with 52 adults were .79 for friends' support, .77 for family participation and involvement, and .55 for rewards and punishments from family members. For the 171 adults in the study by Sallis, Cronbach's alpha coefficients were .84 for friends' support, .91 for family participation, and .61 for rewards and punishments from family members (Sallis, et al., 1987).

Because the "rewards and punishments from family members" sub-scale had lower internal consistency reliability associated with three items (Sallis, et al., 1987), these three items (7,8 and 9) were not used in this research. Thus the family subscale included 10 of the 13 SSE items to measure family members' and friends' support for activity. The SSE scores could range from 10 to 50 for both family members and friends' support.

The SSE was translated from English to Chinese by this researcher for the pilot study with 18 Taiwanese adults with anxiety. The 2-week test-retest correlation coefficients were .95 for family members' support and .89 for friends' support. In the full study for this research, Cronbach's alpha coefficients were .91 for family members' support and .92 for friends' support among the 252 adults with anxiety. A factor analysis yielded two components with eigenvalues of 5.61 and 1.17 for family members' support, accounting 67.73% of the variance in the study. Two factors with eigenvalues of 5.79 and 1.01 were yielded in the factor analysis of friends' support for activity, and they accounted 68.02% of the variance in the study population of 252 Taiwanese adults. The outcomes were similar to the study by Sallis and colleagues (1987) among 171 adults when comparing the eigenvalues greater than 2.

Past Year Regular Physical Activity Checklist

The Past Year Regular Physical Activity Checklist (PYRPA) was modified from the Past Year Regular Physical Exercise Questionnaire (Chen, 1995) to measure regular physical activity performance during the past year for adults in Taiwan. Chen (1995)

used the Past Year Regular Physical Exercise Questionnaire to measure leisure-time regular physical exercise for Taiwanese elders. Chen's questionnaire includes eleven exercises in a checklist and requests that respondents state the duration, frequency and intensity of each exercise. Three levels are used to measure intensity: light, moderate, and heavy. Duration is measured using how many hours spent for each exercise session. Frequency is calculated using how many times each week for exercise sessions, and the number of months that exercise is done during the past year.

This researcher added thirteen items to the PYRPA for the pilot study, based on a study of 504 Taiwanese adults by Li (2001) that reported the 19 activities most likely to be performed. The added items are: Walking upstairs, swimming, mopping floors by hand, shopping, fishing, weight lifting, tennis, basketball, baseball, golf, volleyball, diving, and planting. By adding items (including occupation) to make a total of 25 items and three blank items, provided at the end of the PYRPA for open-ended responses, this researcher sought to measure participants' regular physical activity more accurately for the adult men and women in this research. Table 3.3 presents the number of participants who performed regular physical activity during past year.

In quantifying the information collected in the questionnaires, all data were recorded as energy expenditure, using metabolic equivalent units (MET). One MET is equal to 3.5 milliliters of oxygen per minute per kg of body weight (ml/Kg/min) (ACSM, 2000). The MET of each physical activity is recorded according to the compendium of physical activities by Ainsworth and colleagues (1993) and Montoye and colleagues (1996). Higher METs indicated a greater amount of regular physical activity.

Table 3.3: The Number of Participants Performed Regular Physical Activity during Past Year.

Activities	Men	Women	Total	Percentage
Walking	64	95	159	63.1
Walking upstairs	63	99	162	64.3
Jogging or running	44	38	82	32.5
Aerobics or aerobic dancing	6	19	25	9.9
Biking	29	40	69	27.4
Dancing	3	7	10	4.0
Hiking	31	52	83	32.9
Martial arts	19	29	48	19.0
Swimming	19	30	49	19.4
Doing housecleaning	59	128	187	74.6
Shopping	57	127	184	73.0
Child care	20	41	61	24.2
Fishing	5	0	5	2.0
Occupation	79	105	184	73.2
Weight lifting	13	3	16	6.3
Calisthenics	13	19	32	12.7
Badminton	17	13	30	11.9
Tennis	2	0	2	0.8
Table tennis	10	3	13	5.2
Basketball	19	6	25	9.9
Baseball	9	1	10	4.0
Golf	7	0	7	2.8
Volleyball	7	2	9	3.6
Diving	0	2	2	0.8
Planting	14	42	56	22.2

(N=252 with men = 99 and women = 153)

The three weeks test-retest reliability for Chen's Past Year Regular Physical Exercise Questionnaire was .95 with 11 elderly Taiwanese people. The 2-week test-retest reliability coefficient in this researcher's pilot study was .57, indicating lower stability of the measured items for Taiwanese adults with anxiety. There are two possible causes for low stability. One may be a memory bias in recalling activities over

one year. The other may be that the PYRPA required more attention to answer the questions, and the participants didn't give as much attention when the second PYRPA was completed at home. To manage this possible limitation, this researcher decided to administer the PYRPA by face-to-face interview for the full study. In addition, during the full study among 252 Taiwanese adults with anxiety, criterion validity of the PYRPA was supported by comparing physical activity measured by the 7-Day Physical Activity Recall (7DPAR) (Blair, et al., 1985). The results of this comparison showed that the PYRPA was significantly correlated to the 7DPAR ($r = .68$, $P < .001$) in the study population and this result supported criterion validity of the PYRPA.

7-Day Physical Activity Recall

The 7-Day Physical Activity Recall (7DPAR) interview was used to measure physical activity performance. The purpose of 7DPAR was to support criteria validity of PYRPA. Most of the participants needed about 20 to 30 minutes to complete the 7DPAR. The 7DPAR was developed in 1979 to measure physical activity during the past seven days and revised by Sallies, Haskell and Wood (1985). Individuals were asked to recall their work and leisure time activity at different levels: light, moderate, hard, very hard and duration of sleep. The data were analyzed by calculating for each reported activity METs. Sleep was scored as 1 MET; light activity = 1.5 METs, moderate activity = 4 METs, hard activity = 6 METs, and very hard activity = 10 METs (Blair, 1985).

The 7DPAR' correlation coefficient of test-retest with a 2-week interval was .78 for 43 children and adults and .89 for 163 college students (Sallis, et al., 1988). Concurrent validity was demonstrated using a physical activity questionnaire and maximum oxygen uptake. The results showed that the 7DPAR was significantly correlated to the physical activity questionnaire ($r = .83$, $p < .05$) and with measured maximum oxygen uptake ($r = .61$, $p < .05$) (Sallis, et al., 1988).

The 7DPAR was translated and tested for reliability and validity with 73 female college students in a study by Lin (2000). The correlation coefficient of two-week test-retest reliability was .97. The criterion validity was $r = .86$ ($p <. 001$), when compared with the Tritrac-R3D accelerometer as an objective instrument for estimation of physical activity (Lin, 2000).

Data Analysis

Data analysis strategies included descriptive statistics, Cronbach's alpha coefficients, correlation, independent groups' t-tests, factor analysis, and structural equation modeling. Data error checking and cleaning were done before data analysis, with all data being checked against assumptions of normality, homogeneity of variance (HOV), multi-collinearity of variables, independence, and linearity.

Descriptive statistics included means, ranges, standard deviations, frequencies, and percentages for the demographic data and major variables.

Cronbach's alpha tested the internal consistency reliability of instruments, and factor analysis tested the construct validity of instruments. Pearson correlations were used to analyze relationships among the variables in this study. Independent t-tests examined gender and income adequacy differences for the level of physical activity. Structural equation modeling (SEM) explained both one-way direct and indirect influences of the independent variables on physical activity, allowing estimated measurement errors and incorporating estimates of measurement error into the model (Hoyle, 1995).

The SEM used the EQS 5.7b version software program to examine the PAPA structural model and measurement model. The model fit was checked with the comparative fit index (CFI), the goodness of fit index (GFI), and chi-square analysis to determine whether the structural PAPA model or the measurement PAPA model fit the data better (Garson, 2004; Hoyle, 1995; Munro, 2001). The types and of analysis used are summarized in the Table 3.4.

Table 3.4: Summary of Data Analysis Types

To understand:	Analyze data by:
Population characteristics	Descriptive statistics
Six Instruments basic data	Descriptive statistics
Internal consistency reliability of scales	Cronbach's alpha coefficients
Internal-structure Validity of scales	Factor analysis
Assumption matching	Histogram Fisher's Skewness &Kurtosis Frequency table and stem-and-leaf plot Scatter plot Residual plots examine Levine's test Multicollinearity of variables checking
Relationships among major variables	Pearson correlation
Gender and income adequacy status differences on physical activity performance	Independent t-test
Influences among factors in the Model	Path analysis by structure equation modeling
Model fit	GFI, CFI by structure equation modeling and Chi-square test

Pilot Study

The pilot study served two purposes. The first was to translate three instruments and examine the clarity, test-retest reliability, internal consistency reliability, and validity for the seven instruments proposed for the research. The second purpose was to evaluate the feasibility of the proposed procedures for collecting data in the study.

Three of the study instruments needed translation from English into Chinese. In translating these instruments, equivalence of semantic meaning was necessary in order to avoid having items with two different meanings in the two different languages. Cultural equivalence was needed to ensure that the content of each item was expressed in a similar manner across cultures (Corless, Nicholas & Nokes, 2001; Varricchio, 1997). To satisfy both semantic and cultural equivalence requirements, four steps were involved in the translations developed for the pilot study.

First, the researcher translated three instruments from English to Chinese. They were the State-Trait Anxiety Inventory, the Exercise Confidence Survey, and the Social Support and Exercise instruments. A total of 65 items and three sets of instructions were translated for the instruments. The researcher prepared copies of the 65 items and three sets of instructions in both the original English and Chinese versions, and placed them with a cover letter in package A.

Second, three people evaluated the Chinese versions of the instruments. Two were Masters-prepared nurses who were current doctoral students in Nursing. The third was a doctoral student in education psychology, with a specialty in instrument

measurement. All three were Taiwanese and familiar with the culture in Taiwan. They were each given a package A to assess semantic and cultural equivalence between the original instruments and the Chinese version instruments. These well-educated, bi-lingual experts were asked to identify the appropriateness of translation from English to Chinese and the appropriateness of the instruments for Taiwanese adults. In package A, each survey item and the instructions for each questionnaire had two questions with 4-point Likert scale from 1 (very inappropriate) to 4 (very appropriate). Additionally, the experts were encouraged to write suggestions for improvement below each item to make them more suitable for adults in Taiwan.

Third, a Taiwan-English bilingual doctoral student in philosophy back-translated the questionnaires from Chinese into English. He had no familiarity with the study or with the questionnaires. A total of 65 items and three sets of instructions for the instruments were back translated from Chinese to English. Copies of the 65 items and three sets of instructions were prepared, both in the original English and in the back-translated English, and placed with a cover letter in the package B.

Finally, two American nurses who were current doctoral students evaluated the meaning equivalency between the initial translations and the back-translated versions of the questionnaires. They were given package B and asked to answer a single question about each item. In package B, each item and set of instructions had one question: "How similar do you think is the meaning between these two sentences?" They then scored each item by using 4-rating scale from 1 (not even close) to 4 (very similar).

The acceptable average of scores for each item was 2.5. Most items had average scores higher than 2.5, and only two items had average scores of 2.0 or below. The researcher revised these two items and sent them to be re-evaluated by the experts until the average scores were equal to or higher than 2.5. Using these methods, the Chinese versions of the STAI-Y, ECS, and SSE instruments were completed.

To test the reliability and validity of all instruments and assess the data collection procedures, three steps were included. First, with the approval of the DRC of the School of Nursing, and the Internal Review Board of the University of Texas at Austin, researcher collected data in the Hsin-Yuan Counseling Center located in Taoyuan County, Taiwan.

The researcher identified 19 non-hospitalized men and women who satisfied the sample criteria: non-hospitalized males and females, aged 20 to 45 years, receiving care for anxiety in the Hsin-Yuan Counseling Center, able to verbally communicate and agreeing to participate in this study. Participants with medically diagnosed schizophrenia, mood disorder, or who had impaired cognitive function and physical disability were excluded from this research. The researcher provided a consent form prior to participants' agreeing to participate in this study. Participants were given a package of instruments that contained seven instruments and a cover letter in Chinese. The participants were asked to complete the questionnaires in a private and quiet room in the clinic. The researcher was available to the participants to answer any questions. Participants returned the questionnaires when they finished and were given a duplicate

package of questionnaires with an identical ID number in an addressed stamped envelope. Participants were given a gift of $10.00 in thanks for participating in the study.

Nineteen participants completed the first set of questionnaires, and 18 of the 19 participants completed the second set of questionnaires and returned them to the researcher after two weeks. Descriptive analysis was used to analyze demographic data. A Pearson correlation coefficient was used to examine test-retest reliability and a coefficient alpha listed the internal consistency based on 19 respondents' first set of questionnaires. A factor analysis was also used to examine the internal-structure validity of the instruments (Table 3.5).

In addition, participants' responses and verbal feedback were used for a final revision of the Chinese versions of the instruments. Participants in the pilot study reported four stress life events that were not in the original SLE. They were: pregnancy status, loss of money in the stock market, read books or watched television about issues related to China, and supported candidate who lost the political election. Loss of money in the stock market and supported candidate who lost the election were reported by at least two of the 19 participants. These four events were included in the final version of the SLE. The researcher found no special problems in the processes of administering the questionnaires or in collecting the data.

Finally, to explore the phenomenon of a population with anxiety engaging in physical activity, the relationships between variables proposed in the PAPA model were examined by Person correlation coefficients (Ma, 2005; Ma, Laffrey, Chen, & Wu, 2005). Higher state anxiety was significant correlated with higher trait anxiety and

lower self-efficacy for activity. Higher benefits of activity, higher self-efficacy for activity, higher family members' and friends' support for activity were also significantly related to higher level of physical activity. Gender did not have a significant difference in physical activity performance among the 19 Taiwanese adults with anxiety (Ma, 2005; Ma, Laffrey, Chen, & Wu, 2005), but gender did show a difference in perceived barriers to activity ($t = 2.356$, $p < .05$) and perceived self-efficacy to activity ($t = 2.360$, $p < 0.05$) (Ma, 2005; Ma, Laffrey, Chen, & Wu, 2005). Women perceived lower barriers to activity and lower self-efficacy for activity then men in study. The data from the pilot study did provide some first steps to explore the benefits of physical activity for Taiwanese adults with anxiety. However, the results were unstable because of the small sample size in the pilot study. The correlations among variables in the pilot study are presented in Table 3.6.

Table 3.5: Reliability and Validity of Instruments (N=19)

Scales	Test-retest	Alpha	Factors	Eigenvalues
STAI-Y1	0.63	0.94	1	10.15
STAI-Y2	0.92	0.93	2	9.19, 3.28
SLE (checklist)	0.85	N/A	N/A	N/A
EBBS-benefits	0.87	0.95	3	11.68, 3.50, 3.22
EBBS-barriers	0.87	0.76	1	5.82
ECS	0.73	0.91	2	5.65, 2.01
SSE- family	0.95	0.89	1	6.08
SSE- friend	0.89	0.93	1	6.80
PYRPA (checklist)	0.57	N/A	N/A	N/A

* N=18

Table 3.6: Correlations Among Variables in Pilot Study (N=19)

	1	2	3	4	5	6	7	8	9	10
1	1									
2	-.27	1								
3	-.41	-.24	1							
4	-.22	-.40	.55*	1						
5	-.42	-.28	.29	.15	1					
6	-.18	.26	-.04	-.27	.34	1				
7	-.12	-.10	.20	.18	.22	.34	1			
8	.07	.16	-.25	-.58**	-.01	.54*	.15	1		
9	.40	-.03	-.45	-.05	-.36	-.18	.02	.05	1	
10	.09	.10	.24	-.01	-.07	.41	-.15	.28	.23	1
11	.16	.14	.03	-.26	.15	.70**	.03	.53*	-.28	.48*

* .05 ** .01

1: Age; 2: Educational Years; 3: Trait Anxiety; 4: State Anxiety; 5: Perceived Life Stress Events; 6: Perceived Benefits of Activity; 7: Perceived Barriers to Activity; 8: Perceived Self-Efficacy for Activity; 9: Perceived Family Members' Support for Activity; 10: Perceived Friends' Support for Activity; 11: Physical Activity.

CHAPTER FOUR

PRESENTATION, ANALYSIS, AND INTERPRETATION OF DATA

Chapter four presents the research results for this study. The analysis of the data in this research uses SPSS11.0 and EQS 5.7b. The first section of this chapter reports the information about the sample and major study variables. The second section explains descriptive results regarding group differences in major study variables and bivariate correlations among major study variables. The final section explains the results of the model testing and nine hypotheses testing. A summary, conclusion, and discussion from this analysis follow in chapter five.

Characteristics of Sample and Major Variables

This section presents the general rules of data management, the description of participants' demographic data, and the description of major study variables.

Data Management

Data cleaning for the major demographic variables and major concepts in this study were done before data analysis. Missing data were replaced by the median substitution method to prevent a falsely low score. If missing data were more than 10% for a variable in one case, that case was dropped from the analysis of that variable. Thirteen outliers on the dependent variables (standardized Z scores > ±3.59) were deleted.

Participants' Demographic Data

The final sample included 239 non-hospitalized Taiwanese adults who were receiving care for anxiety in five sites: Hsin-Yuan Counseling Center, Chung-Shan Medical University Hospital, China Medical University Hospital, Cheng Ching Hospital and the Life Improving & Loving Association. No missing data were found in the demographic data. The average age of participants was 34.80 years old and ranged from 20 to 60 with a standard deviation (SD) of 10.18. Approximately two-thirds (n=150) of the participants were women and 37.2% (n=89) were men. Fifty-one percent (n=122) were single and 40.6% (n=97) were married. The majority of participants (n=220, 88.3%) reported having completed a high school education, and only three participants needed the researcher to read items for them, because they were unable to read the questionnaires. Table 4.1 presents the frequency data related to education, and martial status.

Over fifty percent of the participants reported being employed full-time (n=124, 51.9%). Thirty-one participants reported having a part-time job (10.9%), and there were 48 (20.1%) who stated they were unemployed. Thirty-six (15.1%) reported being housewives or househusbands. More than one-half of the participants (n=128, 53.6%) earned less than the average income of 35,223 New Taiwan Dollars (around $1,100 USD) per month for Taiwanese adults, as reported by the 2004 Executive Yuan, R. O. C. (Directorate-General of Budget, 2004). Fifty-three participants (22.2%) reported an average monthly income of 30,000 to 39,999 NTD, and 58 (24.3%) reported an income of 40,000 NTD or more per month. Fifty-nine percent of the participants (n=140)

reported that their income was adequate to meet their needs, while 41% (n=99) reported their income was not adequate to meet their needs.

Table 4.1: Frequency of Education and Martial Status. (N=239)

Variables	Categories	N	%	Male	Female
Education	Less than 6 years	1	0.4	0	1
	Elementary school	8	3.3	0	8
	Junior high school	19	7.9	5	14
	Senior high school	53	22.2	21	32
	2 or 5-year college	42	17.6	21	21
	Baccalaureate	82	34.3	29	53
	Master's or above	34	14.2	13	21
Martial Status	Single	122	51.0	53	69
	Married	99	41.4	33	66
	Divorced	17	7.1	3	14
	Widowed	1	0.4	0	1

Over two-thirds of the participants (n=171, 71.5%) had been diagnosed as having at least one type of anxiety disorder. Sixty-eight (28.5%) participants were under treatment for anxiety disorder not otherwise specified (NOS), indicating they had anxiety or phobic avoidance that did not meet the criteria for a specific disorder. For those who had been diagnosed with a specific anxiety disorder, 13 were diagnosed with obsessive compulsive disorder (OCD), 61 with panic disorder and agoraphobia (PDA), 5 with social phobia (SP), 8 with posttraumatic stress disorder (PTSD), and 84 with generalized anxiety disorder (GAD). None of the participants was diagnosed as having specific fear

and phobias (SFP). Forty-five percent of the participants (n=108) were taking medicine to treat anxiety at the time of the study, and 131 (54.8%) were not. Information related to income adequacy and mental health is shown in Table 4.2.

Table 4.2: Frequency of Participants' Data Related to Finance and Health.

Variables	Categories	N	%
Income adequacy	Yes	140	58.1
	No	99	41.4
Employment status	Full-time employment	124	51.9
	Part-time employment	26	10.9
	Un-employed	48	20.1
	Retired	5	2.1
	Housewife/ House Husband	36	15.1
Income (NTD)	9,999 or below	76	31.8
	10,000 to 19,999	18	7.5
	20,000 to 29,999	34	14.2
	30,000 to 39,999	53	22.2
	40,000 or above	58	24.3
Participants by study sites	Hsin-Yuan Counseling Center	29	12.1
	China Medical University Hospital	72	30.1
	Life Improving & Loving Association	78	32.6
	Cheng Ching Hospital	47	19.7
	Chung-Shan Medical University Hospital	13	5.4
Diagnosed with anxiety disorders	Yes	171	71.5
	Anxiety disorder NOS	68	28.5
Types of anxiety disorder (n=171)	Obsessive Compulsive Disorder	13	5.4
	Panic Disorder and Agoraphobia	61	25.5
	Social Phobia	5	2.1
	Posttraumatic Stress Disorder	8	3.3
	Generalized Anxiety Disorder	84	35.1
	Specific Fear and Phobias	0	0
Taking Medicine Currently	Yes	108	45.2
	No	131	54.8

N=239

Description of Major Variables

Twelve variables were investigated in this study. Gender and income adequacy were dichotomous variables, and they were discussed in the previous section. The average means, ranges, and SDs for age, education, trait anxiety, perceived life stress events, state anxiety, perceived benefits of activity, perceived barriers to activity, perceived self-efficacy for activity, perceived family members' support for activity, and perceived friends' support for activity are shown in Table 4.3.

Table 4.3: Descriptive Statistics for Major Variables.

Variables	**N**	**Range**	**Mean**	**SD**
Age (years)	239	20-60	34.80	10.18
Education (years)	239	3-18	14.10	3.03
Trait Anxiety	239	23-76	52.25	8.55
Perceived Life Stress	235	2-334	72.46	48.58
State Anxiety	239	20-74	46.93	9.40
Perceived Benefits	239	58-116	86.14	10.40
Perceived Barriers	239	14-40	28.97	4.91
Perceived Efficacy	237	12-60	31.60	11.75
Family Support	239	10-50	21.99	9.10
Friends' Support	238	10-49	22.00	9.14
Physical Activity (MET)	239	205.59-289.86	234.88	17.17

Assumption Checking for Major Variables

All data were checked against the assumptions of normality, linearity, independence, homogeneity of variance (HOV), and multi-collinearity of variables. Normality checking was conducted using Fisher's skewness, Fisher's kurtosis, histograms, and stem-and-leaf plots. In checking the assumption of linearity, scatter plots were measured for a linear relationship pattern between pairs of variables. The assumption of independence was examined by residual scatter plots. The HOV was examined by Levine's tests on the samples from the five sites and the samples having different anxiety disorders. Levine's tests also were used to examine the variables of gender, education, income adequacy, and whether or not a participant was taking medication at the time of the study. Finally, calculating correlation coefficients among the variables assessed the multicollinearity assumption.

In histogram graphs and stem-and-leaf plots, most of the variables showed normal distribution that was symmetrical, and bell-shaped with one mode (Munro, 2001). The values of Fisher's skewness and kurtosis tests were less than ±1.96 (Munro, 2001). The data in the skewness and kurtosis tests showed that the distributions of perceived life stress events and physical activity were skewed, but not greater than the definitions for extremely skewed or kurtotic (±3.0 for skewness or greater than ±10 for kurtosis as defined by West, Finch, & Curran, 1995). Since structure equation modeling was estimated by using the maximum likelihood method, the data required normal distribution (Hoyle, 1995). The 13 outliers for physical activity were deleted based on standardized

Z scores greater than ± 3.59. As a result, of the initial 252 participants, data from 239 participants were selected for analyzing sample group differences, correlations among study variables, and the paths in the model.

All data showed linear relationship patterns among variables that satisfied the assumption of linearity. Residual plots showed the pattern of studentized residuals from physical activity against the predicted values of other variables in a random, horizontal band around the line at zero, indicating that the results satisfied the assumption of independence (Norusis, 2002). Levine's tests indicated that some of the variables did not satisfy the assumption of HOV when the sample was divided into groups based on gender, income adequacy, medication use, study sites, and type of anxiety disorders; therefore, statistical tests that adjust for the HOV problem were used for these variables. These tests indicated that the population samples had similar anxiety levels. The data satisfied the multicollinearity assumption, with all bivariate correlation coefficients less than .85 (Kline, 1998). Table 4.4, Checking Assumption of Normality and HOV, for 239 participants' data is shown below.

Table 4.4: Checking Assumption of Normality and HOV by Sample Groups. (N=239)

Variables	Skewness	Kurtosis	Levine's test (F value)				
			Gender	Income	Medication	Sites	Diagnosis
Age (years)	.688	-.397	1.709	0.019	22.476***	6.040***	4.367**
Education (years)	-.919	.650	8.464**	0.111	7.280**	2.192	3.819**
Trait Anxiety	-.156	.625	0.128	0.438	1.247	2.719*	1.117
Perceived Life Stress	1.825	5.359	0.034	4.540*	6.709*	3.529**	5.597***
State Anxiety	-.038	-.012	0.188	3.025	2.315	2.446*	2.110
Perceived Benefits	.732	1.409	0.117	0.058	3.142	3.147*	1.291
Perceived Barriers	-.464	.417	1.006	0.337	4.873*	2.504*	0.973
Perceived Efficacy	.130	-.681	0.338	1.220	0.683	1.165	2.152
Family Support	.631	-.376	7.743**	5.972*	0.007	2.167	0.845
Friends' Support	.562	-.316	0.607	0.338	1.553	1.455	1.801
Physical Activity (MET)	.886	.189	4.142	0.499	0.501	4.710**	2.832*

* p<.05, ** p< .01. ***p< .001.

Descriptive Findings

To increase understanding about the factors that influence level of physical activity for a population with anxiety, t-tests and bivariate correlation coefficients are presented here.

Group Differences

Differences in the major variables by gender, income adequacy, and use of medication at the time of the study were measured with t-tests. Differences in the major variables by study site and by type of anxiety disorders were tested with ANOVA and Scheffe's tests. Correlations among the major variables were examined with Pearson correlation coefficients.

Levine's tests examined the assumption of HOV among groups. The results for variables that did not have equal variances between two groups were based on an assumption of unequal variances by t-tests. For those variables that didn't satisfy HOV among populations by study sites and types of anxiety disorder, the Welch test examined the differences among groups, and Post Hoc tests using the Dunnett's C tests examined the data.

Group differences in the major study variables were examined by gender, income adequacy, use of medication for anxiety, study site, and type of anxiety disorder. Age ($t = -2.38$, $p < .05$) and perceived self-efficacy for activity ($t = 3.79$, $p < .001$) differed significantly by gender. The women were significantly older and reported lower level of physical activity performance than the men.

Income adequacy was measured by one dichotomous item: whether income was adequate to meet a participant's needs. Perceived life stress events ($t = -2.30$, $p < .05$), state anxiety ($t = -3.91$, $p < .001$), trait anxiety ($t = -2.99$, $p < .01$), perceived barriers to activity ($t = -2,86$, $p < .01$), perceived self-efficacy for activity ($t = 3.60$, $p < .001$) and perceived family members' support for activity ($t = 2.99$, $p < .01$) differed significantly between the two income adequacy groups. Participants with inadequate income reported significantly higher trait anxiety, state anxiety, life stress events, and barriers to activity than those with adequate incomes. In addition, participants with adequate income reported higher self-efficacy for activity and higher family members' support for activity.

Participants taking medication for anxiety symptoms differed significantly from those not taking medication in age ($t = 5.55$, $p < .001$), education ($t = -6.17$, $p < .001$), perceived life stress events ($t = 4.03$, $p < .001$), trait anxiety ($t = 5.08$, $p < .001$), perceived barriers to activity ($t = 2.92$, $p < .01$), and perceived friends' support for activity ($t = -3.67$, $p < .001$).

Participants who were taking medication for anxiety symptoms were older, had lower education, and lower friends' support for activity, and had higher perceived life stress, trait anxiety, and perceived barriers to activity than participants who were not taking medication. Table 4.5 presents the significant t-tests results among the major study variables by gender, income adequacy and use of anxiety medication.

Table 4.5: Differences in Major Study Variables by Gender, Income Adequacy, and Use of Medication.

Groups	Variables		Mean	SDs	t value	95% C.I.
Gender	**Age**	M	32.79	9.31	-2.38*	-5.86 - -.55
		F	35.99	10.50		
	Efficacy	M	35.22	11.14	3.79***	+2.79 - +8.83
		F	29.42	11.60		
Income Adequacy	**PLSE** [a]	Y	66.07	39.58	-2.30*	-29.35 - -2.24
		N	81.86	58.39		
	SA	Y	44.99	8.55	-3.91***	-7.04 - -2.32
		N	49.68	9.89		
	TA	Y	50.88	8.24	-2.99**	-5.48 - -1.13
		N	54.18	8.66		
	PBAA	Y	28.21	4.99	-2.86**	-3.07 - - .56
		N	30.03	4.61		
	PSEA	Y	33.87	11.28	3.60***	+2.46 - +8.41
		N	28.43	11.72		
	FASA [a]	Y	23.41	9.56	2.99**	+1.17 - +5.67
		N	19.99	8.03		
Use of Medication	**Age** [a]	Y	38.69	11.17	5.55***	+4.58 - +9.63
		N	31.59	7.99		
	Education [a]	Y	12.83	3.19	-6.17***	-3.05 - -1.57
		N	15.15	2.46		
	PLSE [a]	Y	86.19	54.49	4.03***	+12.96 - +37.85
		N	60.78	39.54		
	TA	Y	55.19	7.59	5.08***	+3.29 - +7.46
		N	49.82	8.57		
	PBAA [a]	Y	29.97	4.10	2.92**	+ .63 - +3.04
		N	28.14	5.37		
	FRSA	Y	19.68	8.19	-3.67***	-6.54 - -1.97
		N	23.93	9.46		

N=239, α = .05 * P< .05, ** P < .01, ***P< .001. [a] : unequal variances.

TA: Trait Anxiety. SA: State Anxiety.
PLSE: Perceived Life Stress Events. PBEA: Perceived Benefits of Activity.
PBAA: Perceived Barriers to Activity. PSEA: Perceived Self-Efficacy for Activity.
FASA: Perceived Family Members' for Activity.
FRSA: Perceived Friends' Support for Activity.

Participants from the five sites differed significantly in age ($F= 2.57$, $p< .05$), education ($F= 3.72$, $P< .01$), and the level of physical activity ($F= 4.24$, $P< .01$). The post hoc tests reported that participants from Hsin-Yuan Counseling Center were significantly younger than participants from the Life Improving & Loving Association ($F= 2.57$, $P< .05$). Also, the education of participants from Hsin-Yuan Counseling Center was higher than that of participants from Chung-Shan Medical University Hospital ($F= 3.72$, $P< .05$). Participants from the Life Improving & Loving Association reported significantly higher levels of physical activity than participants from Chung-Shan Medical University Hospital ($F= 4.24$, $P< .05$). Table 4.6 presents the data concerning significant differences in the major study variables among participants from the five sites.

The participants with a diagnosis of specific anxiety disorders had significant differences for most study variables, except family members' support for activity. Those with different anxiety disorders showed differences in age ($F=10.05$, $P< .001$), education ($F=15.26$, $P< .001$), trait anxiety ($F=26.67$, $p< .001$), state anxiety ($F=10.56$, $p< .001$), perceived life stress events ($F=5.82$, $p< .001$), perceived benefits of activity ($F=4.37$, $p< .01$), perceived barriers to activity ($F=4.94$, $p< .001$), perceived self-efficacy for activity ($F=4.84$, $p< .001$), perceived friends' support for activity ($F=2.59$, $p< .05$), and levels of physical activity ($F= 4.60$, $p< .01$).

Participants with PDA were older and had lower education than those with other anxiety disorders, but had the higher perceived self-efficacy for activity and higher levels of physical activity than those with other anxiety disorders. Participants with PTSD and

NOS had lower trait and state anxiety and lower perceived life stress events than those with other anxiety disorders. Participants with social phobia and OCD reported higher state anxiety, trait anxiety, perceived life stress events, perceived barriers to activity, and lower perceived self-efficacy and friends' support for activity than those with other anxiety disorders. Table 4.7 presents the data concerning significant differences in the major study variables among participants with different anxiety disorders.

Table 4.6: Differences in Major Study Variables by Study Site

(S Test: Scheffe Test. D Test: Dunnett's C test)

Variables	Group	Mean	SDs	F value	Post Hoc Tests
Age [a] (M=34.80)	HY	30.17	7.38	2.57*	D Test:
	CM	34.90	10.42	Welch test	HY→LI*
	LI	36.83	11.53		
	CC	33.68	8.58		
	CS	36.38	7.87		
Education (M=14.01)	HY	15.45	1.84	3.72**	S Test:
	CM	13.64	3.01		HY→CS*
	LI	14.18	3.14		
	CC	14.43	3.15		
	CS	12.00	2.92		
Physical Activity [a] (M=234.88)	HY	232.53	20.13	4.24**	D Test:
	CM	232.22	11.91	Welch test	LI→ CS**
	LI	240.98	18.86		
	CC	232.60	16.37		
	CS	226.45	18.97		

N=239, $\alpha = .05$ * P< .05, ** P < .01, ***P< .001. [a] : unequal variances.

HY: Hsin-Yuan Counseling Center.
CM: China Medical University Hospital
LI: Life Improving & Loving Association.
CC: Cheng Ching Hospital.
CS: Chung-Shan Medical University Hospital.

Table 4.7: Differences in Major Study Variables by Type of Anxiety Disorder

(S Test: Scheffe Test. D Test: Dunnett's C test)

Variables	Group	Mean	SDs	F value	Post Hoc Tests
Age [a] (M=34.80)	NOS	30.82	6.48	10.05***	D Test:
	OCD	29.62	8.95	Welch test	PDA →NOS***
	PDA	41.66	10.14		PDA →OCD***
	SP	32.40	16.07		PDA →GAD***
	PTSD	34.00	8.70		
	GAD	34.06	10.27		
Education [a] (M=14.01)	NOS	15.85	1.77	15.26***	D Test:
	OCD	14.08	2.25	Welch test	NOS→ PDA**
	PDA	11.84	2.77		NOS→GAD***
	SP	14.40	4.98		PDA →GAD***
	PTSD	13.00	3.38		
	GAD	14.42	2.98		
Trait Anxiety (M=52.25)	NOS	45.00	6.32	26.67***	S Test:
	OCD	59.08	5.38		NOS→OCD***
	PDA	54.61	7.70		NOS→ PDA***
	SP	65.60	5.77		NOS→SP***
	PTSD	46.63	7.46		NOS→GAD***
	GAD	55.08	6.92		PTSD→OCD*
					PTSD→SP**
					PTSD→PDA*
					PTSD→GAD*
					PDA→SP**
State Anxiety (M=46.93)	NOS	42.12	7.47	10.56***	S Test:
	OCD	47.92	8.15		SP→NOS***
	PDA	47.38	10.06		SP→OCD*
	SP	63.80	8.70		SP→ PDA**
	PTSD	42.25	9.98		SP→PTSD**
	GAD	49.80	8.16		SP→GAD*
					PDA→NOS*
					GAD→NOS*

N=239, α = .05 * P< .05, ** P < .01, ***P< .001. [a] : unequal variances.

NOS: Anxiety Disorder Not Otherwise Specified.
OCD: Obsessive Compulsive Disorder.
PDA: Panic Disorder and Agoraphobia.
SP: Social Phobia.
PTSD: Posttraumatic Stress Disorder.
GAD: Generalized Anxiety Disorder.

Table 4.7 (continued): Differences in Major Study Variables by Type of Anxiety Disorder (S Test: Scheffe Test. D Test: Dunnett's C test)

Perceived Stress [a] (M=72.46)	NOS	49.50	6.32	5.82***	D Test:
	OCD	79.46	5.38	Welch test	NOS→ PDA***
	PDA	82.07	7.70		NOS→GAD*
	SP	126.80	5.77		
	PTSD	55.38	7.46		
	GAD	80.27	6.92		
Benefits (M=86.14)	NOS	88.07	11.12	4.37**	S Test:
	OCD	78.31	13.19		OCD→PTSD*
	PDA	86.89	9.00		OCD→NOS*
	SP	78.80	14.52		
	PTSD	95.50	11.38		
	GAD	84.79	8.89		
Barriers (M=28.97)	NOS	27.09	5.42	4.94***	S Test:
	OCD	30.08	4.48		NOS→GAD**
	PDA	29.34	3.92		
	SP	32.80	6.14		
	PTSD	25.50	4.69		
	GAD	30.14	4.60		
Efficacy (M=31.60)	NOS	33.26	11.63	4.84***	S Test:
	OCD	30.00	12.95		PDA →GAD**
	PDA	35.54	12.98		NOS→GAD**
	SP	22.40	5.68		
	PTSD	37.00	6.35		
	GAD	27.71	9.91		
Friends' Support (M=22.00)	NOS	24.51	10.13	2.59*	→No significant differences found in any two groups.
	OCD	17.15	7.20		
	PDA	20.84	8.04		
	SP	18.60	6.27		
	PTSD	26.13	12.52		
	GAD	21.36	8.63		
Physical Activity [a] (M=234.88)	NOS	232.29	16.80	4.60**	PDA→NOS**
	OCD	226.74	15.74	Welch test	PDA→OCD**
	PDA	243.30	18.57		PDA→GAD**
	SP	234.87	8.41		
	PTSD	235.50	22.94		
	GAD	232.05	14.45		

N=239, α = .05 * P< .05, ** P < .01, ***P< .001. [a] : unequal variances.

Correlation Coefficients among Variables

Bivariate correlations for the variables in the PAPA model were analyzed by Pearson correlation coefficients (Table 4.8). Level of physical activity was significantly and positively correlated with age, perceived benefits, perceived self-efficacy, family members' and friends' support for activity and negatively correlated with trait anxiety and state anxiety.

Trait anxiety was strongly positively correlated with state anxiety ($r = .65$, $P < .001$). Trait anxiety and state anxiety were significantly positively correlated with perceived life stress events and perceived barriers to activity. They were significantly negatively correlated with perceived benefits, self-efficacy, family members', and friends' support for activity.

Perceived life stress events were significantly and positively correlated with state anxiety, trait anxiety, and perceived barriers to activity, and negatively correlated with perceived benefits and self-efficacy for activity. These correlations indicate that participants who perceived higher stress from life events had more perceived barriers and lower confidence in their ability to perform regular physical activity.

Perceived benefits of activity were significantly positively correlated with perceived self-efficacy, family members' support and friends' support, and negatively correlated with perceived barriers to activity. These results indicated that participants who perceived higher benefits had higher self-efficacy for activity, higher friends' support for activity, and fewer perceived barriers to activity.

Although perceived barriers to activity were negatively correlated with perceived self-efficacy for activity, family members' support and friends' support (Table 4.8), this variable was not significantly correlated to level of physical activity. In contrast, perceived self-efficacy for activity was moderately positively correlated with physical activity ($r = .45$, $p < .001$), and significantly correlated with all of the other study variables except education.

Perceived family members' support and friends' support were significantly positively correlated with perceived benefits and self-efficacy for activity, and negatively correlated with state anxiety, trait anxiety, and perceived barriers to activity. Table 4.8 shows the Pearson correlation coefficients among the major study variables.

Table 4.8: Pearson Correlation Among Variables (N=239)

	Age	Edu.	Trait	State	Stress	Benefits	Barriers	Efficacy	Family	Friends
Age	1.00									
Edu.	-.45***	1.00								
Trait	-.04	-.11	1.00							
State	-.07	-.03	.65***	1.00						
Stress	.03	-.04	.43***	.36***	1.00					
Benefits	.09	.00	-.37***	-.31***	-.13*	1.00				
Barriers	.07	-.11	.41***	.39***	.30***	-.44***	1.00			
Efficacy	.15*	-.05	-.33**	-.39***	-.16*	.41***	-.40***	1.00		
Family	.07	-.01	-.17**	-.16*	-.07	.15*	-.17**	.26***	1.00	
Friends	.03	.12	-.32***	-.22**	-.10	.35***	-.28***	.41***	.24**	1.00
PA	.27***	-.09	-.16*	-.16*	-.08	.29***	-.09	.45***	.14*	.22**

α = .05 * P< .05, ** P < .01, ***P< .001

PA: physical activity

Model Testing and Hypotheses Testing

The major purpose of this research was to examine the fit of the PAPA model to the data. The model test was analyzed by structure equation modeling. The assumptions of normality, linearity, independence, and homogeneity of variance were examined by the SPSS program. Running the EQS 5.7b program, the multivariate outliers were screened using the Estimation of Maximum Likelihood method. The process of assumptions checking, model testing, and revision of hypotheses are described below.

Model Testing

The PAPA model proposed in this study includes eleven independent variables to predict one dependent variable, physical activity. A 4-step process was used to modify the initially hypothesized PAPA model. The first step was to specify the initial model by analyzing the eight equations in the hypothesized PAPA model. The second step in the process was to refine the hypothesized PAPA model by dropping and adding parameters among variables in the model based on the Lagrange Multiplier (LM) Test and the Wald Test. The third step was to add parameters to the model, based on the largest standardized residuals among variables. The final step was to evaluate the equations in the final version of the PAPA model.

The First Step

There were 12 variables in the PAPA model. Four personal factors: gender, education, income adequacy, and trait anxiety, were endogenous variables that were hypothesized not to be affected by any other variables in the model (MacCallum, 1995). Seven cognition-emotion variables and one behavioral outcome variable: perceived life stress events, state anxiety, perceived benefits of activity, perceived barriers to activity, perceived family members' support for activity, perceived friends' support from friends, and physical activity, were exogenous variables that were hypothesized to receive directional influence from other variables in the model (MacCallum, 1995). Eight equations were included in the hypothesized model (Figure 4.1) and were examined in the EQS program:

Physical Activity = *gender + *education + *income adequacy + *trait anxiety +
*state anxiety + *perceived stress + *benefits + *barriers +
*efficacy + *family + *friends + *error.

Perceived Stress = *gender + *education + *income adequacy + *trait anxiety + *error.

State Anxiety = *gender + *education + *income adequacy + *trait anxiety +
*perceived stress + *error.

Benefits = *gender + *education + *income adequacy + *trait anxiety + *error.

Barriers = *gender + *education + *income adequacy + *trait anxiety + *error.

Efficacy = *gender + *education + *income adequacy + *trait anxiety + *error.

Family = *gender + *education + *income adequacy + *trait anxiety + *error.

Friends = *gender + *education + *income adequacy + *trait anxiety + *error.

Note: *Parameter coefficients were estimated by the software program

The results of the hypothesized equations were:

Physical Activity = .039*gender -.064*education + .040*income adequacy - .096*trait anxiety -.013*state anxiety - .165*stress + .153*benefits - .132*barriers + .405*efficacy + .015*family + .030*friends + .861*error of measuring physical activity.

Perceived Stress = -. 017*gender -.009*education - .084*income adequacy + .411*trait anxiety + .908*error of measuring perceived stress life events.

State Anxiety = -.157*gender - .044*education -.154*income adequacy + .60*trait anxiety + .091*perceived stress + .731*error of measuring state anxiety.

Benefits = .053*gender - .042*education + .013*income adequacy -.375*trait anxiety + .925*error of measuring perceived benefits of activity.

Barriers = -.057*gender + .070 *education -.127*income adequacy + .381*trait anxiety + .912*error of measuring perceived barriers to activity.

Efficacy = .308*gender + .101*education + .237*income adequacy -.294*trait anxiety + .867*error of measuring perceived efficacy for activity.

Family = -.031 *gender + .026*education + .054*income adequacy -.147*trait anxiety + .975*error of measuring perceived family members' support.

Friends = + .021*gender + .083*education + .054*income adequacy -.298*trait anxiety + .949*error of measuring perceived friends' support.

Fifty-two free parameters in the model were analyzed. The path analysis showed the Comparative Fit Index (CFI) was .747 with Root-Mean-Square Error of Approximation (RMSEA) of .15. The chi-square (χ^2) was (26, N=239) = 168.81, p< .001. Since the CFI < .95, the RMSEA >.05 and the χ^2 = 168.81, p< .001, the hypothesized PAPA model did not fit the data.

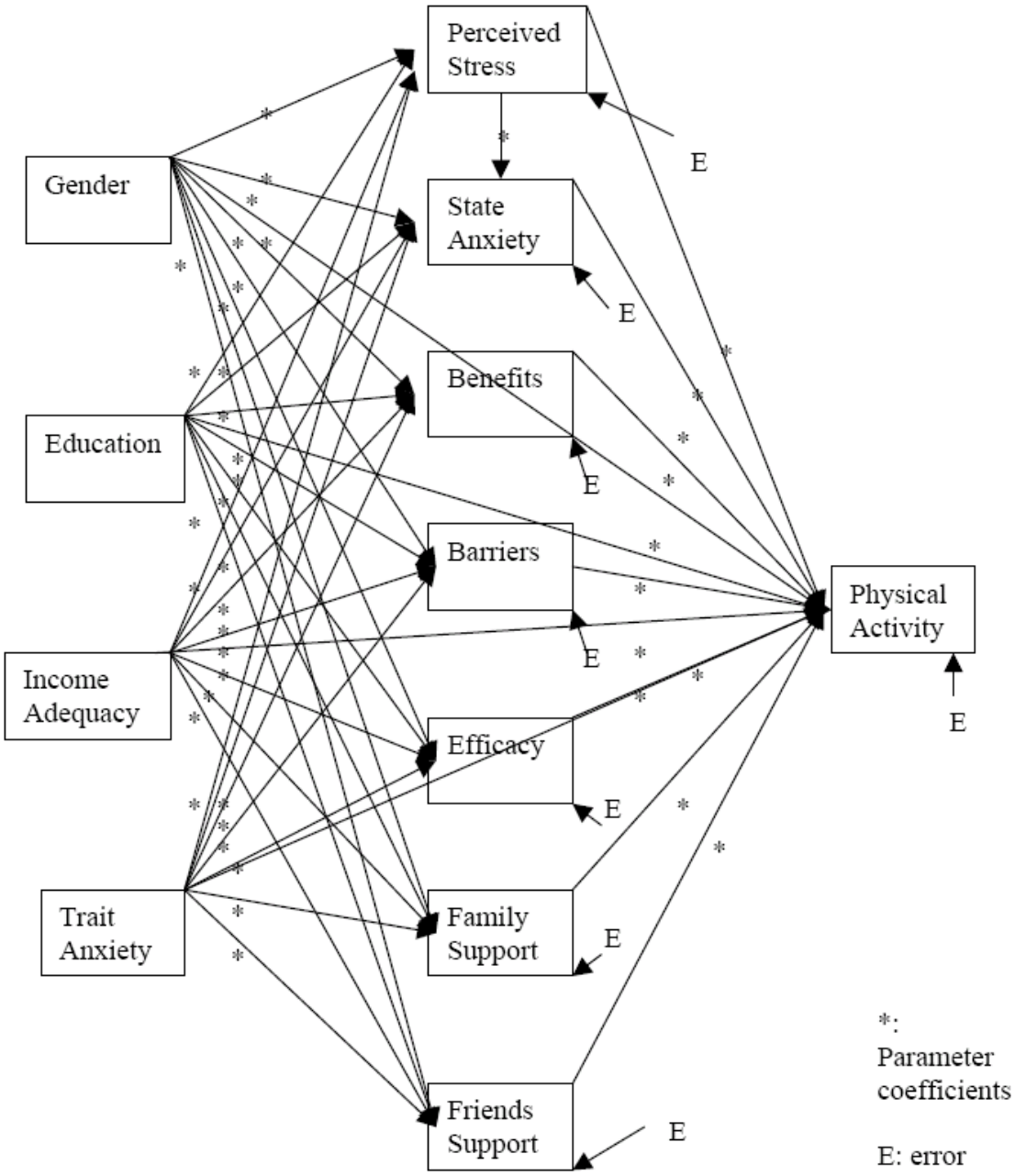

Figure 4.1: Eight Path Equations in Hypothesized PAPA Model

The Second Step

The second step in the process was to refine the hypothesized PAPA model by dropping and adding parameters among variables in the model one-by-one, based on the LM Test and the Wald Test. Table 4.9 shows the 20 parameters that were deleted and the 2 parameters that were added to the model. Since the refined model hypothesized that income adequacy was influenced by gender and trait anxiety, income adequacy became an additional exogenous variable.

Table 4.9: Parameters Added and Dropped in Step 2

Variables	**Gender**	**Education**	**Income Adequacy***	**Trait Anxiety**	**Physical Activity***
Physical Activity*	Drop	Drop	Drop	Drop	
Perceived Stress*	Drop	Drop			
State Anxiety*		Drop			Drop
Benefits*	Drop	Drop	Drop		
Barriers*	Drop	Drop			
Efficacy*					
Family*	Drop	Drop			Drop
Friends*	Drop	Drop	Drop		Drop
Income*	Add			Add	

* exogenous variables

After deleting and adding the paths, the nine structural equations were:

Income adequacy = *gender + *trait anxiety + *error.

Physical Activity = *perceived stress + *benefits + *barriers + *efficacy + *error.

Perceived Stress = *trait anxiety + *income adequacy + *error.

State Anxiety = *gender + *income adequacy + *trait anxiety + *perceived stress + *error.

Benefits = *trait anxiety + *error.

Barriers = *trait anxiety + *income adequacy + *error.

Efficacy = *gender + *income adequacy + *trait anxiety + *error.

Family = *income adequacy + *trait anxiety + *error.

Friends = *trait anxiety + *error.

*Parameter coefficients estimated by the software program

The results of these nine equations were:

Income adequacy = -.226*gender -.185*trait anxiety + .956*error of income adequacy.

Physical Activity = -.136*perceived stress + .174*benefits - .125*barriers + .451*efficacy + .870*error of physical activity.

Perceived Stress = .408*trait anxiety - .080*income adequacy + .903*error of measuring perceived life stress events.

State Anxiety = - .153*gender -.154*income adequacy + .589*trait anxiety + .091*perceived stress + .725* of measuring state anxiety.

Benefits = -.372*trait anxiety + .928*error of measuring perceived benefits.

Barriers = .389*trait anxiety -.109*income adequacy + .907*error of measuring perceived barriers.

Efficacy = .309*gender + .238*income adequacy -.295*trait anxiety + .870*error of measuring perceived efficacy.

Family = .158*income adequacy -.144*trait anxiety + .973*error of measuring family support.

Friends = -.315*trait anxiety + .968*error of measuring friends' support.

Thirty-four parameters in the model were analyzed. The path analysis showed a CFI of .798 with an RMSEA of .10, and χ^2 (35, N=239) = 158, p< .001. In comparison to the originally hypothesized equations in the model, the refined PAPA model was a better fit to the sample data; however, the CFI was still less than .95, the RMSEA was greater than .05, and the chi-square was significant. The refined model was again modified in a third step.

The Third Step

The third step in the process was to add structural equations based on the largest standardized residuals among the variables. Five parameters among variables were added to the model in this step. Perceived self-efficacy for activity showed the largest standardized residuals. Four added parameters were from perceived benefits of activity, barriers to activity, family members' support for activity and friends' support for activity to perceived self-efficacy for activity. One parameter from perceived benefits of activity to barriers to activity also was added. Thirty-eight parameters in the model were analyzed.

The nine structural equations were:

Income adequacy = *gender + *trait anxiety + *error.

Physical Activity = *perceived stress +*state anxiety + *benefits + *barriers + *efficacy + *error.

Perceived Stress = *trait anxiety + *income adequacy + *error.

State Anxiety = *gender +*income adequacy + *trait anxiety + *perceived stress +*error.

Benefits = *trait anxiety + *error.

Barriers = *trait anxiety + *income adequacy + *benefits + *error.

Efficacy = *gender + *education + *income adequacy + *benefits + *barriers + *family + *friends + *error.

Family = *income adequacy + *trait anxiety + *error.

Friends = *trait anxiety + *error.

*The software program estimated parameter coefficients.

The results of these nine equations were the following:

Income adequacy = -.226*gender -.185 *trait anxiety + .956*error of income adequacy.

Physical Activity = -.137*perceived stress - .159*state anxiety + .176*benefits - .126 *barriers + .438*efficacy + 876*error of physical activity.

Perceived Stress = .408*trait anxiety - .080*income adequacy + .903*error of stress.

State Anxiety = -.151*gender - .154*income adequacy + .589*trait anxiety + .091*perceived stress + .725*error of state anxiety.

Benefits = - .372*trait anxiety + .928*error of perceived benefits.

Barriers = .262*trait anxiety - .108*income adequacy - .334 benefits + .853*error of perceived barriers.

Efficacy = .290*gender - .123*education + .199*income adequacy + .202*benefits - .206*barriers + .102*family + .259*friends + .791*error of efficacy.

Family = .158*income adequacy -.144 *trait anxiety + .973*error of family support.

Friends = -.315*trait anxiety + .949*error of friends' support.

The path analysis showed that the CFI was .954, with a RMSEA of .05. Chi-square (40, N=239) was 65.95 with $p < .01$. This modified PAPA model a better fit the sample data, since the CFI was greater than .95 (Hu & Bentler, 1995). However, the significant χ^2 indicated that the model and the data were still significantly different. The results of the third step suggested that future modification was needed to better fit the data.

The Fourth Step

The fourth step in the process modified the structural equations by deleting and adding parameters among variables based on the LM Test and the Wald Test for the modified PAPA model as developed in the third step. Three parameters were added (benefits to friend's support, state anxiety to barriers, and state anxiety to self-efficacy) and 8 parameters were dropped (education to self-efficacy, family members' support to self-efficacy, trait anxiety and income adequacy to family members' support, income adequacy to perceived stress and barriers, perceived stress to state anxiety, and barriers to physical activity). Since no paths were retained from education and family members' support to any other variables, education and family members' support were dropped from the model.

The eight equations in the fourth step of the process were:

Income adequacy = *gender + *trait anxiety + *error.

Physical Activity = *perceived stress + *benefits + *barriers + *efficacy + *error.

Perceived Stress = *trait anxiety + *error.

State Anxiety = *gender +*income adequacy + *trait anxiety + *error.

Benefits = *trait anxiety + *error.

Barriers = *trait anxiety + *state anxiety + *benefits + *error.

Efficacy = *gender + *income adequacy + *state anxiety + *benefits +*barriers + *friends + *error.

Friends = *trait anxiety + *benefits + *error.

*The software program estimated parameter coefficients.

The results of eight equations in the fourth step process were:

Income adequacy = -.226*gender -.185 *trait anxiety + .956*error of income adequacy.

Physical Activity = -.163*perceived stress + .136*benefits - .185 *barriers + .412*efficacy + 876*error of physical activity.

Perceived Stress = .423*trait anxiety + .906*error of stress.

State Anxiety = -.153*gender - .161*income adequacy + .626*trait anxiety + .730*error of state anxiety.

Benefits = - .372*trait anxiety + .928*error of perceived benefits.

Barriers = .171*trait anxiety + .182*state anxiety - .321 benefits + .852*error of perceived barriers.

Efficacy = .253*gender + .187*income adequacy - .143*state anxiety + .193*benefits - .157*barriers + .250*friends + .784*error of efficacy for activity.

Friends = -.214*trait anxiety + .271*benefits + .915*error of friends' support.

The step 4 results showed the CFI was 1.00, with RMSEA of .01. Chi-square (24, N=239) was 24.79, p= .417. This modified PAPA model was a good fit to the sample data for the 31 parameters examined, because it produced a CFI > .95, a RMSEA < .05, and a chi-square = 24.79, p> .05. The total amount of explained variance in physical activity was 23.3%, with direct influences from perceived life stress events, perceived benefits of activity, perceived barriers to activity, and perceived self-efficacy for activity. Thus, the PAPA model, as modified in the fourth step, was not significantly different from the data. The modified PAPA model in the fourth step became the final version of the PAPA model. Three personal factors: gender, income adequacy, and trait anxiety, and six cognition-emotion variables: perceived life stress events, state anxiety, perceived benefits of activity, perceived barriers to activity, perceived self-efficacy for activity, and perceived friends' support for activity, influenced level of physical activity. Figure 4.2 presents the data for the final version of the PAPA model.

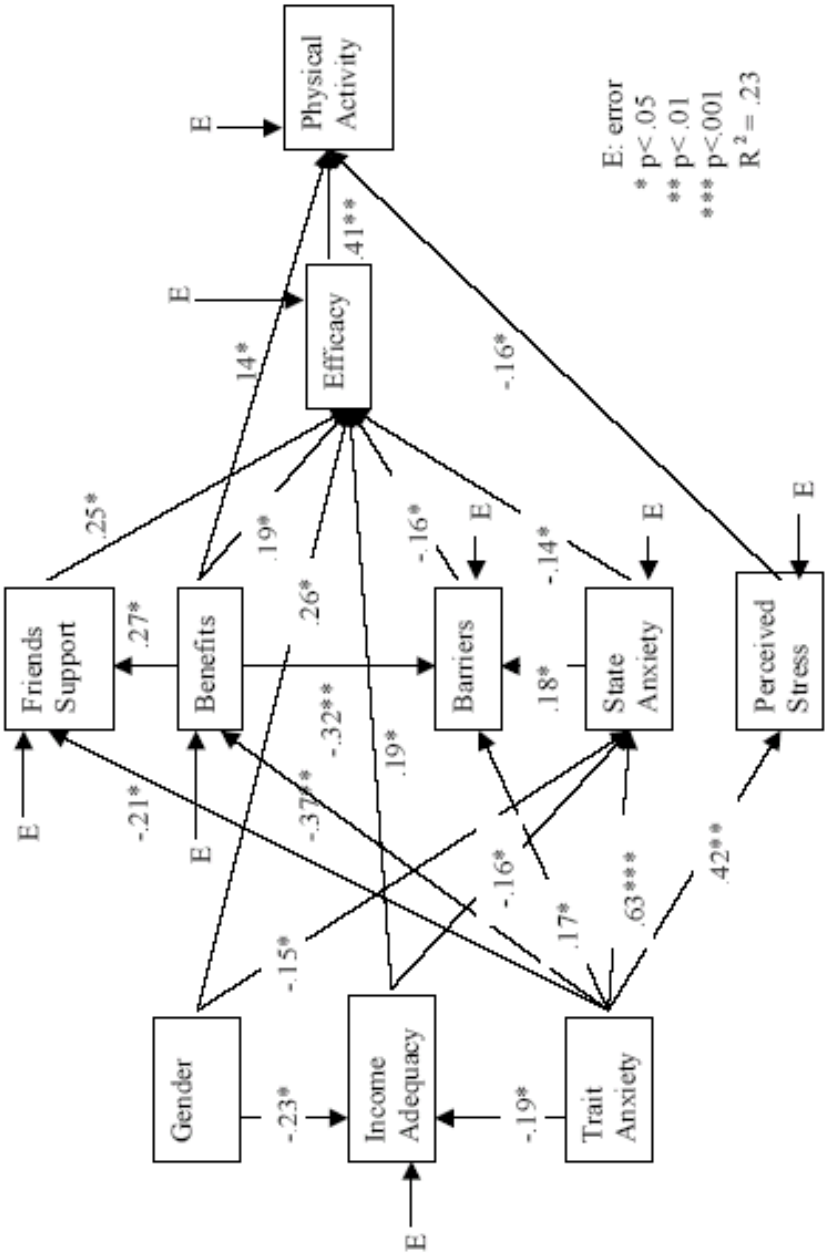

Figure 4.2: Final Version of PAPA Model

Research Hypotheses Testing

Ten research hypotheses were analyzed in modifying the PAPA model. In the final version of the PAPA model, three personal factors (gender, income adequacy, and trait anxiety) and six cognition-emotion factors (perceived life stress events, state anxiety, perceived benefits of activity, barriers to activity, perceived self-efficacy, and perceived friends' support for activity) were predictors of physical activity. Structural equation modeling examined nine equations.

Perceived life stress events, perceived self-efficacy for activity, and perceived benefits of activity directly influenced level of physical activity. Three personal factors (gender, income adequacy, and trait anxiety) and four cognition-emotion variables (state anxiety, perceived benefits of activity, perceived barriers to activity, perceived friends' support for activity) had indirect influences on level of physical activity. The influences of those predictor variables on the level of physical activity are summarized in Table 4.10. The results of hypotheses testing were:

Hypothesis 1: Gender, educational level, income adequacy, and trait anxiety have statistically significant direct influences on the level of physical activity.

Hypothesis 1 was rejected. Gender, educational level, income adequacy, and trait anxiety did not have statistically significant direct influences on the level of physical activity.

Hypothesis 2: Gender, educational level, income adequacy and trait anxiety have statistically significant indirect influences on the level of physical activity through the cognition-emotion factors (PLSE, SA, PBEA, PBAA, PSEA, FASA, and FRSA).

Hypothesis 2 was partially supported. Gender indirectly influenced level of physical activity through income adequacy, state anxiety, perceived self-efficacy for activity, and perceived barriers to activity. Income adequacy indirectly influenced level of physical activity through state anxiety, perceived self-efficacy for activity and perceived barriers to activity. Trait anxiety indirectly influenced level of physical activity through income adequacy and the six cognition-emotion variables. However, the variable, educational level was dropped from the final version of PAPA model.

Hypothesis 3: Perceived life stress events have a statistically significant direct negative influence on the level of physical activity.

Hypothesis 3 was supported. Perceived life stress events had a statistically significant direct negative influence on level of physical activity.

Hypothesis 4: Perceived life stress events have a statistically significant indirect influence on the level of physical activity through state anxiety.

Hypothesis 4 was rejected. Perceived life stress events did not have a statistically significant indirect influence on level of physical activity via state anxiety.

Hypothesis 5: State anxiety has a statistically significant direct negative influence on the level of physical activity.

Hypothesis 5 was rejected. State anxiety did not have a statistically significant direct negative influence on level of physical activity. But, the results showed that state anxiety indirectly influenced level of physical activity through perceived barriers to activity and perceived self-efficacy for activity.

Hypothesis 6: Perceived benefits of activity have a statistically significant direct positive influence on the level of physical activity.

Hypothesis 6 was supported. Perceived benefits of activity had a statistically significant direct positive influence on level of physical activity. In addition, the results also showed that perceived benefits of activity indirectly influenced level of physical activity through perceived barriers to activity, perceived friends' support and perceived self-efficacy for activity.

Hypothesis 7: Perceived barriers to activity have a statistically significant direct negative influence on the level of physical activity.

Hypothesis 7 was rejected. Perceived barriers to activity did not have a statistically significant direct negative influence on level of physical activity. However, the results showed that perceived barriers to activity indirectly influenced level of physical activity through perceived self-efficacy for activity.

Hypothesis 8: Perceived self-efficacy has statistically significant direct positive influence on the level of physical activity.

Hypothesis 8 was supported. Perceived self-efficacy for activity had a statistically significant direct positive influence on level of physical activity.

Hypothesis 9: Perceived family members' support for activity has a statistically significant direct positive influence on the level of physical activity.

Hypothesis 9 was rejected. Perceived family members' support for activity did not have a statistically significant direct positive influence on level of physical activity.

Hypothesis 10: Perceived friends' support for activity has a statistically significant direct positive influence on the level of physical activity.

Hypothesis 10 was rejected. Perceived friends' support for activity did not have a statistically significant direct positive influence on level of physical activity. However, perceived friends' support for activity indirectly influenced level of physical activity through perceived self-efficacy for activity.

Table 4.10: Influences of Predictor Variables on Physical Activity

Predictor Variables	**Through**	**Causal Effect**		
		Direct	**Indirect**	**Total**
Gender	PSEA,		.10	
	SA, PSEA,		.09	
	SA, PBAA, PSEA,		.01	
	IA, PSEA,		.04	
	IA, SA, PSEA,		.00	
	IA, SA, PBAA, PSEA,		.00	
	Total		.24	.24
Income Adequacy (IA)	PSEA,		.07	
	SA, PSEA,		.01	
	SA, PBAA, PSEA,		.00	
	Total		.08	.08

Table 4.10 (continued): Influences of Predictor Variables on Physical Activity

Predictor Variables	Through	Causal Effect (r)		
		Direct	Indirect	Total
Trait Anxiety (TA)	IA, PSEA,		-.04	
	IA, SA, PSEA,		-.00	
	IA, SA, PBAA, PSEA,		-.00	
	FRSA, PSEA,		-.02	
	PBEA,		-.03	
	PBEA, PSEA,		-.05	
	PBEA, PBAA, PSEA,		-.01	
	PBAA, PSEA,		-.01	
	SA, PSEA,		-.04	
	SA, PBAA, PSEA,		-.01	
	PLSE,		-.07	
	Total		-.28	-.28
Perceived Life Stress Events (PLSE)		-.16		
	Total	-.16		-.16
State Anxiety (SA)	PSEA,		-.06	
	PBAA, PSEA,		-.01	
	Total		-.07	-.08
Perceived Benefits of Activity (PBEA)		.14		
	PSEA		.08	
	PBAA, PSEA,		.02	
	FRSA, PSEA		.03	
	Total	.14	.13	.27
Perceived Self-Efficacy for Activity (PSEA)		.41		
	Total	.41		.41
Perceived Barriers to Activity (PBAA)	PSEA		-.07	
	Total		-.07	-.07
Friends' Support for Activity (FRSA)	PSEA		.01	
	Total		.01	.01

CHAPTER FIVE

SUMMARY, DISCUSSION, IMPLICATIONS AND RECOMMENDATIONS

Chapter five presents a summary, discussion, and implications of this study, and recommendations for future research. The purposes, research hypotheses, brief background of the theoretical framework, methodology, and findings of this study are included in the summary. The discussion reviews the issues related to methodology and study findings. The last section suggests implications of the study findings for nursing research, nursing education and nursing practice. Recommendations for future research are also included.

Summary

The purpose of this study was to test a physical activity model in Taiwanese adults with anxiety. The PAPA model was based on two theories: Pender's revised health promotion model (Pender, Murdaugh & Parsons, 2002) and Spielberger's cross-sectional model of anxiety (Spielberger, 1966). Three constructs, personal factors, cognition-emotion and behavioral outcome, were modified from Pender's revised HPM. The variables of perceived benefits of activity, perceived barriers to activity, perceived self-efficacy for activity and perceived family members' support and friends' support for activity were adopted from Pender's revised HPM. State anxiety, trait anxiety, and

perceived life stress events were adopted from Spielberger's CSMA. Trait anxiety, gender, education, and income adequacy were conceptualized as personal factors. Perceived life stress events, state anxiety, perceived benefits of activity, perceived barriers to activity, perceived self-efficacy for activity, perceived family members' and friends' support for activity were conceptualized as the cognition-emotion construct. The behavioral outcome was physical activity.

Ten research hypotheses examined the directional relationships among the eleven independent variables and physical activity in this cross-sectional, explanatory study. Non-probability sampling was used to recruit non-hospitalized men and women, aged 20 to 60 years, receiving care for anxiety at five sites: 1) Hsin-Yuan Counseling Center, 2) Life Improving & Loving Association; 3) Chung-Shan Medical University Hospital; 4) China Medical University Hospital; and 5) Cheng Ching Hospital. Participants were able to verbally communicate and agreed to participate in this study. The participants were being treated for anxiety, but they were without medically diagnosed schizophrenia, mood disorder, impaired cognitive function or physical disability. The sample of 239 participants included 89 men and 150 women after dropping 13 outliers. The average age of participants was 34.80 years (SD = 10.18), and education was 14.10 years (SD= 3.03). Most of the participants (n=171, 71.5%) had been diagnosed with a specific anxiety disorder, and 45.2% (n=108) were currently taking medication for anxiety symptoms.

The 12 variables were measured with eight instruments: a) Demographic Inventory (DI), b) State-Trait Anxiety Inventory Form Y (STAI-Y), c) Stressful Life

Events Checklist (SLE), d) Exercise Benefits/Barriers Scale (EBBS), e) Exercise Confidence Survey (ECS), e) Social Support and Exercise (SSE), f) Past Year Regular Physical Activity Checklist (PYRPA), and g) 7-Day Physical Activity Recall (7DPAR). Two-week test-retest reliability was assessed in a pilot study with 18 Taiwanese adults with anxiety. The 2-week test-retest correlation coefficients were above .70 for all instruments, except the state anxiety subscale of the STAI-Y(r= .62), the ECS (r= .68), the PYRPA (r= .57) and the 7DPAR (no data for population with anxiety). The lower state anxiety and ECS test-retest coefficients may be a function of changes in one's current feelings (Spielberger, 1983) and confidence over time (Sallis et al., 1988). The lower stability of the PYRPA may be related to limited memory in recalling activities over one year. Because of this and the length of time required to complete the PYRPA, it was administered in face-to-face interviews. Meanwhile, the validity of the PYRPA was examined by comparing its data with the 7DPAR. The results of this comparison showed that the PYRPA was significantly positively correlated with the 7DPAR ($r = .68$, $P < .001$) in the study population.

Most variables satisfied the assumptions of normality, linearity, independence, and lack of multi-collinearity of variables after the 13 outliers were dropped from the data set. However, Levine's test showed unequal variances for many variables when examining different groups. For those variables with unequal variances, results were based on assumptions of unequal variances, when testing differences among groups based on gender, income adequacy, and use of medication. The Welch test measured

differences in the major variables among participant groups in the five study sites and participant groups with different anxiety disorders.

The initial descriptive analysis provided for a better understanding of the study variables. Age ($t = -2.38$, $P < .05$) and perceived self-efficacy for activity ($t = 3.79$, $p < .001$) differed significantly by gender. The women were older and had lower self-efficacy than did the men. Participants with adequate income reported fewer perceived life stress events ($t = -2.30$, $p < .05$), lower state anxiety ($t = -3.91$, $p < .001$), lower trait anxiety ($t = -2.99$, $p < .01$), fewer perceived barriers to activity ($t = -2,86$, $p < .01$), but higher perceived self-efficacy for activity ($t = 3.60$, $p < .001$) and higher family members' support for activity ($t = 2.99$, $p < .01$) than those who reported inadequate income.

In addition, 108 participants who, at the time of the study, were taking medication for anxiety symptoms differed significantly from those (n=131) who were not taking medication in age ($t = 5.55$, $p < .001$), education ($t = -6.17$, $p < .001$), perceived life stress events ($t = 4.03$, $p < .001$), trait anxiety ($t = 5.08$, $p < .001$), perceived barriers to activity ($t = 2.99$, $p < .01$), and perceived friends' support for activity ($t=-3.67$, $p < .001$). These findings indicate that participants taking medication for anxiety symptoms at the time of the study were older, had greater perceived stress, state anxiety, perceived barriers and lower education and friends' support for activity than did those who were not taking medication.

Participants from the five sites did not differ in most of the major study variables, except age ($F = 2.57$, $p < .05$), education ($F = 3.72$, $P < .01$), and physical activity ($F = 4.24$, $P < .01$). However, participants with different anxiety disorders differed significantly in

age (F = 10.05, P< .001), education (F = 15.26, P< .001), trait anxiety (F = 26.67, p< .001), state anxiety (F = 10.56, p< .001), perceived life stress events (F = 5.82, p< .001), perceived benefits of activity (F = 4.37, p< .01), perceived barriers to activity (F = 4.94, p< .001), perceived self-efficacy for activity (F = 4.84, p< .001), perceived friends' support for activity (F = 2.59, p< .05), and the level of physical activity (F = 4.60, p< .01). These findings indicated that participants selected from different sites had similar characteristics, but participants with different anxiety disorders had different characteristics.

For the relationships among variables tested by Pearson correlation coefficients, the results showed high correlation among the variables. The level of physical activity was significantly positively correlated with age (r= .27, p< .001), perceived benefits (r= .29, p< .001), perceived self-efficacy (r= .45, p< .001), family members' support (r= .14, p< .05) and friends' support (r= .22, p< .01) for activity and negatively correlated with trait anxiety (r=-.16, p< .05) and state anxiety (r= -.16, p< .05).

In the model testing process, four steps modified the initially hypothesized PAPA model paths using the EQS 5.7b program. The final version of the PAPA model showed CFI equaled 1.00, RMSEA < .05, with χ^2 (24, N=239) = 24.79, p= .417, indicating a good fit with the data. The final version of the PAPA model consisted of three personal variables, six cognition-emotion variables, and one behavior outcome. Gender, income adequacy, and trait anxiety were in the construct of personal factors. Perceived life stress events, state anxiety, perceived benefits of activity, perceived barriers to activity,

perceived self-efficacy for activity, and perceived friends' support for activity were in the construct of cognition-emotion.

Perceived life stress events, perceived benefits of activity, and perceived self-efficacy for activity directly influenced level of physical activity. Three personal factors and four cognition-emotion variables (state anxiety, perceived benefits, perceived barriers, and friends' support for activity) indirectly influenced level of physical activity. The total amount of explained variance in physical activity was 23.3%, with direct influences from perceived life stress events, perceived benefits of activity, and perceived self-efficacy for activity.

Discussion

The discussion presents the issues related to methodology and study findings.

Issues Related to Methodology

This section discusses research methodology issues including research design, sampling, instruments, and statistical analysis of the data.

First, this research used a cross-sectional, explanatory design to explain directional relationships among the variables. The PAPA model included eleven independent variables and one dependent variable, physical activity. There is little information reported in the literature concerning these relationships for Taiwanese men and women with anxiety. An explanatory design was used to explore the phenomena of physical activity for the population. Interpretations of the results from a study using an explanatory design should be made cautiously, and that is a limitation for this research. In order better to investigate causality and changes in variables over time, a longitudinal design will be necessary in future studies.

Second, the data were collected using a cross-sectional sample, which is more efficient, because data are collected at one point in time (Poit & Hungler, 1995), but this convenience sample presents a limitation of the study. The findings can be generalized only to Taiwanese adults with anxiety in the five sampled sites. Most of the study variables did not differ by study site, but they differed by type of anxiety disorder regardless of site. This indicated that the populations from the five sites had similar characteristics, but that participants with different types of anxiety disorders had different

characteristics, even though they all were suffering from anxiety. Large samples with each type of anxiety disorder will be needed in future research to more clearly understand the factors that predict physical activity.

Third, eight instruments were used to measure the major concepts in this study. Most of the scales had good reliability and validity for both the English and Chinese versions. The PYRPA had low stability reliability in the pilot study. On the other hand, the 7DPAR had good test-retest reliability data in a population of Taiwanese undergraduate students (Lin, 2002), but it had never been examined for stability reliability in a population with anxiety. Therefore, the PYRPA was selected as the measure of physical activity in this study. To enhance accuracy and reliability, the PYRPA was administered via one-to-one interviews. Future testing will be needed to continue to assess stability reliability for this instrument.

The 7DPAR was administered in this study as a criterion measure for assessment of criterion validity of the PYRPA. Participants required 20 to 40 minutes to complete the 7DPAR; many of them indicated they felt tired after finishing the 7DPAR. This may have caused some bias in the study.

Structural equation modeling was used to test the PAPA model, and it is very sensitive to sample size (Garson, 2004; Hoyle, 1995). Since only 239 data sets were retained for the analysis, after the outlers were removed, the power was approximately 70% in this study, causing a possible Type II error. A larger sample size will be needed in future research to decrease the likelihood of type II error.

Discussion Related to Study Findings

This section discusses the descriptive and model testing findings, separately. The discussion follows the constructs of personal factors, cognition-emotion variables, and physical activity.

Descriptive Findings

The level of physical activity did not differ by gender. This result differs from Previous studies, in which men usually reported higher levels of physical activity than women (Davis & Katzman, 1998; Sale, Guppy & El-Sayed, 2000). This result may have occurred, because physical activity included household chores, and these are primarily performed by women. Meanwhile, many studies have reported that lower income is associated with lower levels of physical activity (Desmond, et al., 1993; Parks, et al., 2001). This research showed different findings, in that persons with adequate income did not differ from those with inadequate income in their levels of physical activity. Most activities that Taiwanese adults perform do not require spending much money, and this may explain why levels of physical activity did not differ by income adequacy.

Although participants who were taking medication for anxiety symptoms at the time of the study were older, had greater perceived life stress events, state anxiety, perceived barriers and lower education and friends' support for activity than did those who were not taking medicine, levels of physical activity did not differ significantly between these two groups. This suggests that taking medicine for anxiety may not

influence a person's engaging in physical activity, and health providers need to encourage people to engage in physical activity, whether or not they are taking medication for their anxiety.

Participants from the five sites significantly differed in level of physical activity ($F= 4.24$, $P< .01$). The persons selected from the Life Improving & Loving Association reported significantly higher physical activity levels than persons selected from other study sites reported. A possible reason for this finding is that the Life Improving & Loving Association provides regular group counseling and regular lectures to encourage members' engaging in physical activity. Also, this suggests that providing information related to physical activity may actually increase levels of physical activity for persons with anxiety.

Levels of physical activity significantly differed for participants with different anxiety disorders. This finding indicated that participants with different levels of physical activity. Persons with PAD reported higher levels of physical activity and those with OCD reported lower levels of physical activity when compared to participants with other anxiety disorders. Two possible reasons may explain this finding. First, the people with PDA may have greater motivation to manage panic attacks, and regular physical activity is one of the preventive strategies recommended to prevent panic attacks. Second, people with OCD suffer from obsessive thoughts and compulsive behaviors that may hinder their engaging in the types of physical activities identified in this study.

Model Testing Results

Gender, income adequacy, and trait anxiety indirectly influenced level of physical activity through cognition-emotion variables, but none of these variables had a direct influence on physical activity. In contrast, education was dropped from the model, because it did not have either a direct or an indirect influence on level of physical activity.

Although gender was shown to be a significant predictor of physical activity in many other studies (Belza & Warms, 2004; Sallis, et al., 1986), gender did not have a significant direct effect on the level of physical activity in Mason-Hawkes (1990) study or in the persons with anxiety disorder in this study. Mason-Hawkes (1990) compared the goodness of fit from two models separated by gender to better understand the influence of gender in the model. No significant difference was found, indicating that the models were the same when tested in men and women. Gender had an indirect influence on physical activity through income adequacy and perceived self-efficacy for activity, but the small number of men in the sample did not allow for testing the PAPA model with men and women separately. Future study might include more male participants to increase the understanding about the role of gender.

Income adequacy status was a significant predictor of increased physical activity in a study of 198 adult females (Nies & Kershaw, 2002). In addition, income level significantly predicted physical activity directly and indirectly through cognition-emotion variables in a study of Thai elders (Wasawachaisuwikrom, 2001). However, this study showed different findings, in that income adequacy had only an indirect influence on level of physical activity through state anxiety, perceived barriers to activity and

perceived self-efficacy for activity. Two possible reasons may explain this finding. One is that people in Taiwan engage in physical activities without having much related cost. The other is that persons with inadequate income may have jobs that require more physical activity. Thus, income adequacy did not have a direct influence on physical activity.

The average trait anxiety score was 52.25, indicating that the study participants had moderate levels of trait anxiety based on the standard trait anxiety scale described by Spielberger (1983). This finding is understandable in that all participants were receiving care for anxiety in this study. Although trait anxiety did not have a direct influence on level of physical activity, it influenced physical activity indirectly through perceived life stress events, state anxiety, perceived benefits of activity, perceived barriers to activity, and perceived friends' support for activity. This may show that trait anxiety is a crucial factor influencing participants' lives, cognitive processes and emotional states.

Education was dropped from the final PAPA model, because the analysis indicated that education level had no influence on level of physical activity directly or indirectly. This outcome is different from other studies that showed education is a significant predictor of level of physical activity (Salmon et al., 2000; Trost et al., 2002). The finding in this research indicated that the education did not play an important role for a Taiwanese population with anxiety engaging in physical activity. One explanation for this finding is that the mean education level was 14 years, indicating a highly educated sample. Another explanation may be related to the different cultural background in the

Taiwanese population. People in Taiwan believe that academic achievement is the first priority in life (Kuan & Hwang, 1997), because a good future depends only on academic success. That is the reason that Taiwanese people strive for high levels of education. The priority for physical activity always follows that for academic achievement (Chao & Sue, 1996; Chen, Lee & Stevenson, 1996); therefore, educational level may not be the same significant predictor of physical activity for Taiwanese people as it may be for other cultures.

Seven cognition-emotional variables were hypothesized as having direct influences on levels of physical activity, and the results showed that three had direct influences, and four had indirect influences.

Perceived life stress events directly negatively influenced the level of physical activity, but did not have an indirect influence on level of physical activity. State anxiety indirectly influenced level of physical activity through perceived barriers to activity and perceived self-efficacy for activity. This finding indicated that stress had stronger direct influence than state anxiety on the level of physical activity, but no finding was discovered to explain the possible reasons. One might speculate that, in the absence of encouragement to engage in physical activity as a means of reducing stress, factors that result in more stress, such as demanding jobs or relationships, might limit one's available time to engage in physical activity. Further advanced research is needed to explore the roles of stress and anxiety in predicting physical activity.

Perceived benefits of activity had a significant positive direct influence on the level of physical activity. Perceived benefits of activity seemed more important in

predicting physical activity for adults with anxiety in this study than was found in a study of 135 adults in the general population (Stutts, 1997). One reason for the different findings may be that the benefits of physical activity had a noticeable impact on reducing moderate levels of anxiety (Glenister, 1996; Martinsen, 1993; Plante, 1996; Tucker, 1990).

Perceived barriers to activity had an indirect negative influence on the level of physical activity, but did not have direct influence on the level of physical activity. This finding was different from the outcomes in other studies, which showed that perceived barriers to activity was a powerful predictor of physical activity (Mitchell & Olds, 1999; Tsai, 1996; Wu & Pender, 2002). A possible reason may be related to characteristics of the Taiwanese culture and of the sample. An important possible barrier to activity for Taiwanese people is that the priority of physical activity is secondary to academic achievement (Chao & Sue, 1996; Chen, Lee & Stevenson, 1996). Most of the participants in this study did not have to pay attention to academic work because their formal education was completed. In addition, Taiwanese culture emphasizes that a person needs regular movement in order to maintain wellness by balancing Qi and good blood circulation (Hwu, Coates, & Boore, 2001). This may explain why the barriers to activity did not directly influence levels of physical activity.

Perceived self-efficacy has been shown to be a most powerful predictor of physical activity in many studies (McDaniel, 1999; Miller, et al., 2002; Sargent, 2001; Stutts, 2002). This study also supported this finding, because perceived self-efficacy for activity significantly influenced level of physical activity both directly and indirectly.

The results showed perceived self-efficacy for activity significantly directly influenced (r= .41) the level of physical activity. Meanwhile, perceived self-efficacy played a role as a mediator to the level of physical activity for many study variables, such as gender, income adequacy, state anxiety, barriers, and friends' support for activity. Perceived self-efficacy also was a moderator between perceived benefits of activity and the level of physical activity. These outcomes indicated that persons with adequate income, lower state anxiety, those who experienced lower barriers to activity, and those who received higher support from friends had increased confidence in their abilities to do physical activity.

Perceived social support has been positively correlated to physical activity for adults and had a direct impact on physical activity participation (Dowda et al., 2003). This study differed from Dowda et al., in that it demonstrated that perceived friends' support for activity had an indirect influence on the level of physical activity only through perceived self-efficacy for activity. Perceived family members' support was dropped from the PAPA model, indicating family members' support did not have influences on levels of physical activity. These outcomes were very different from other research findings, such as in the study by Giles-Corti and Donovan (2002), and indicated that persons with anxiety may need more support to engage in physical activity from friends than from family members.

The PAPA model was designed to predict physical activity performance for a population with anxiety and only three factors directly influenced the level of physical activity: perceived life stress events, perceived benefits of activity and perceived self-

efficacy for activity. These three direct effects explained 23.3% of the variance in levels of physical activity. This finding indicated there might be other variables not considered in this study that influence levels of physical activity for Taiwanese people with anxiety. Including more variables in the analysis or analyzing alternative equivalent models is needed for future study.

Implication and Recommendations

This section suggests implications of the study findings for nursing research, nursing education and nursing practice. Recommendations for future research also are included.

Implications for Nursing Research

From the literature review, physical activity is effective in reducing anxiety among the general population and for people with higher levels of anxiety symptoms (Plants, 1996). Few published studies in nursing have addressed physical activity as a means for promoting the mental health of persons with anxiety. Since mental health and physical activity both are major areas of concern in the Healthy People 2010 Report (USDDH, 2000), this research provided an opportunity to increase awareness of the need to consider the role of physical activity in mental health promotion.

The PAPA model was tested in a sample of adults with anxiety, and when revised was found to have a good fit to the data. The results clarified the structure of the PAPA model and its ability to describe the factors that influence levels of physical activity in persons with anxiety. Perceived benefits of activity, perceived self-efficacy for activity, and perceived life stress events directly influenced level of physical activity. Gender, income adequacy, trait anxiety, state anxiety, perceived benefits of activity, perceived barriers to activity, and perceived friends' support for activity had indirect influences on levels of physical activity. Future research, using a predictive, longitudinal design and

different sampling methods can help to understand which variables best predict physical activity in the population.

In addition, the study examined gender and income adequacy and their relationships with levels of physical activity and the cognition-emotion variables in this study. Future research also might compare the data from this study with other populations and cultures and expand the knowledge base in nursing.

Implications for Nursing Education

The outcomes in this research can provide empirical information for nursing faculty to use in guiding students who have an interest in physical activity and anxiety. The information not only focused on the results for the PAPA model, but also considered the correlation coefficients among variables and the many differences among sub-groups in the sample. In addition, this research provided an opportunity to learn about anxiety and physical activity in a different culture and in a population not often studied in nursing education.

This study also provided new information about all of the relationships among personal factors, perceived stress life events, state anxiety, benefits of activity, barriers to activity, family members' and friends' supports for activity, self-efficacy for activity, and regular physical activity for the study population. Nursing faculty members can provide new information to students based on the outcomes of this research.

Implications for Nursing Practice

Since knowledge related to physical activity performance for a Taiwanese population with anxiety previously was unknown, this study provided new information to fill a gap and help nursing clinical professionals better understand the phenomenon related to the level of physical activity for Taiwanese adults with anxiety. Mental health nurses may encourage members of a population with anxiety to engage in physical activity to maintain their emotional stability by reducing patients' barriers, increasing their self-efficacy for and knowledge of the benefits of activity. In advanced practice, mental health nurses or public health nurses may design a program based on the PAPA model to help a population with anxiety to engage in regular physical activity, in order to improve coping strategies and to promote healthier lives. In addition, based on the information related to the differences of gender and income adequacy, nurses may develop different strategies to help populations with anxiety according to gender and financial needs.

Recommendations for Future Research

The findings of this research indicate at least five opportunities for future study:

1. Future research may use larger samples to examine the model differences among gender and income adequacy. This would provide more information, based on different participants' basic backgrounds, to better understand the influences of gender and income adequacy on levels of physical activity.

2. Future research might examine which variables best predict physical activity for a population with anxiety by using a predictive, longitudinal design study method. This would provide more detailed information to mental health nurses or public health nurses to help a population with anxiety engage in regular physical activity.

3. This study focused on a population between the ages of 20 to 60 years. Populations older than 60 or younger than 20 might be included in future research.

4. Age was not included as a variable in the PAPA model, but age was significantly correlated to the level of physical activity performance in this study. Future research might involve using the variable of age for a more comprehensive view of the PAPA model.

5. Participants with different anxiety disorders showed differences in many major variables in the model, indicating that different disorders had their own specific characteristics. To obtain more stable data, participants selected in future research might be chosen based on having similar types of anxiety, such as the following:

1) Participants with GAD and panic disorder; or
2) Participants with OCD and social phobia; or
3) Participants with PTSD and participants without any types of anxiety disorders, but currently suffering from anxiety symptoms.

This research suggests at least these five opportunities for future research. With each opportunity, additional discoveries will be made that not only add to the body of knowledge on this subject, but also improve care and treatment for people with anxiety. Finally, the following hypotheses are suggested from this research for future studies.

1. Gender, income adequacy and trait anxiety have no statistically significant direct influences on level of physical activity.
2. Gender has a statistically significant indirect influence on level of physical activity through income adequacy, state anxiety, perceived barriers to activity, and perceived self-efficacy for activity.
3. Income adequacy has a statistically significant indirect influence on level of physical activity through state anxiety, perceived barriers to activity and perceived self-efficacy for activity.
4. Trait anxiety has a statistically significant indirect negative influence on level of physical activity through income adequacy, perceived life stress events, state anxiety, perceived benefits of activity, perceived barriers to activity, perceived self-efficacy for activity, and perceived friends' support for activity.
5. Perceived life stress events have statistically significant direct negative influences on level of physical activity.
6. Perceived self-efficacy for activity has a statistically significant direct positive influence on level of physical activity.
7. Perceived benefits of activity have statistically significant direct positive influences on level of physical activity.
8. Perceived benefits of activity have statistically significant indirect positive influences on level of physical activity through perceived barriers, perceived self-efficacy for activity, and perceived friends' support for activity.

9. State anxiety, perceived barriers to activity, and perceived friends' support for activity have no statistically significant direct negative influences on level of physical activity.
10. State anxiety has a statistically significant indirect negative influence on level of physical activity through perceived barriers to activity and perceived self-efficacy for activity.
11. Perceived barriers to activity have statistically significant indirect negative influences on level of physical activity through perceived self-efficacy for activity.
12. Perceived friends' support for activity has a statistically significant indirect positive influence on level of physical activity through perceived self-efficacy for activity.

APPENDIX A

HUMAN SUBJECTS APPROVAL DOCUMENTS

IRB Approval from China Medical University Hospital

中國醫藥大學附設醫院
CHINA MEDICAL UNIVERSITY HOSPITAL
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The Institutional Review Board
China Medical University Hospital, Taichung, Taiwan
Tel: 886-4-22052121 ext: 4011 Fax: 886-4-2208-2385

Expedited Approval Date：Dec. 24, 2004

To： Hsien-Yuan Lane , Director of Psychiatry,
China Medical University Hospital.

From：Martin M-T Fuh MD,DMSci.
Chairman, Institutional Review Board

Subject：Predictors of Physical Activity for Adults with Anxiety in Taiwan.

The Institutional Review Board has recommend the approval of the protocol number DMR93-IRB-120 date Dec. 24, 2004, for the protocol identified above, for a period of 12 months, and has determined that human subjects will be at risk.

Approval of your research project is, therefore, granted until Dec. 23, 2005. You are reminded that a change in protocol in this project requires its resubmission to the Board. By the end of this period you may be asked to inform the Board on the status of your project. If this has not been completed, you may request renewed approval at that time.

Also, the principal investigator must report to the Chairman of the Institutional Review Board promptly, and in writing, any unanticipated problems involving risks to the subjects of others, such as adverse reactions to biological drugs, radio-isotopes or to medical devices.

CHINA MEDICAL UNIVERSITY HOSPITAL
The Institutional Review Board
NO.2, YUH-DER ROAD, TAICHUNG, TAIWAN, R.O.C.

Martin M-T Fuh MD, DMSci.
Chairman, Institutional Review Board
China Medical University Hospital

IRB Approval from University of Texas at Austin

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Appligent
Produced with Appligent Technology

OFFICE OF RESEARCH SUPPORT & COMPLIANCE

THE UNIVERSITY OF TEXAS AT AUSTIN

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Date: **2/14/2005**

PI(s): **Wei-Fen Ma** Department & Mail Code: **NURSING SCHOOL** **D0100**

FWA# 00002030

Dear: **Wei-Fen Ma**

IRB APPROVAL – IRB Protocol # **2004-11-0002**

Title: **Predictors of regular physical activity for adults with anxiety in Taiwan.**

In accordance with Federal Regulations for review of research protocols, the Institutional Review Board has reviewed the above referenced protocol and found that it met approval under an Expedited category for the reviewed the above referenced protocol and found that it met approval under an Expedited category for the following period of time:

Your study has been approved from 02/11/2005 – 02/11/2006

Expedited category of approval:

(1) ☐ Clinical studies of drugs and medical devices only when condition (a) or (b) is met. (a) Research on drugs for which an investigational new drug application (21 CFR Part 312) is not required. (Note: Research on marketed drugs that significantly increases the risks or decreases the acceptability of the risks associated with the use of the product is not eligible for expedited review). (b) Research on medical devices for which (i) an investigational device exemption application (21 CFR Part 812) is not required; or (ii) the medical device is cleared/approved for marketing and the medical device is being used in accordance with its cleared/approved labeling.

(2) ☐ Collection of blood samples by finger stick, heel stick, ear stick, or venipuncture as follows: (a) from healthy, non-pregnant adults who weigh at least 110 pounds. For these subjects, the amounts drawn may not exceed 550 ml in an 8 week period and collection may not occur more frequently than 2 times per week; or (b) from other adults and children2, considering the age, weight, and health of the subjects, the collection procedure, the amount of blood to be collected, and the frequency with which it will be collected. For these subjects, the amount drawn may not exceed the lesser of 50 ml or 3 ml per kg in an 8 week period and collection may not occur more frequently than 2 times per week.

(3) ☐ Prospective collection of biological specimens for research purposes by Non-invasive means. Examples: (a) hair and nail clippings in a non-disfiguring manner; (b) deciduous teeth at time of exfoliation or if routine patient care indicates a need for extraction; (c) permanent teeth if routine patient care indicates a need for extraction; (d) excreta and external secretions (including sweat); (e) un-cannulated saliva collected either in an un-stimulated fashion or stimulated by chewing gumbase or wax or by applying a dilute citric solution to the tongue; (f) placenta removed at delivery; (g) amniotic fluid obtained at the time of rupture of the membrane prior to or during labor; (h) supra- and subgingival dental plaque and calculus, provided the collection procedure is not more invasive than routine prophylactic scaling of the teeth and the process is accomplished in accordance with accepted prophylactic techniques; (i) mucosal and skin cells collected by buccal scraping or swab, skin swab, or mouth washings; (j) sputum collected after saline mist nebulization.

(4) ☐ Collection of data through noninvasive procedures (not involving general anesthesia or sedation) routinely employed in clinical practice, excluding procedures involving x-rays or microwaves. Where medical devices are employed, they must be cleared/approved for marketing. (Studies intended to evaluate the safety and effectiveness of the medical device are not generally eligible for expedited review, including studies of cleared medical devices for new indications). Examples: (a) physical sensors that are applied either to the surface of the body or at a distance and do not involve input of significant amounts of energy into the subject or an invasion of the subject's privacy; (b) weighing or testing sensory acuity; (c) magnetic resonance imaging; (d) electrocardiography, electroencephalography, thermography, detection of naturally occurring radioactivity, electroretinography, ultrasound, diagnostic infrared imaging, doppler blood flow, and echocardiography; (e) moderate exercise, muscular strength testing, body composition assessment, and flexibility testing where appropriate given the age, weight, and health of the individual.

(5) ☐ Research involving materials (data, documents, records, or specimens) that have been collected, or will be collected solely for non-research purposes (such as medical treatment or diagnosis). (NOTE: Some research in this category may be exempt from the HHS regulations for the protection of human subjects. 45 CFR 46.101(b)(4). This listing refers only to research that is not exempt).

(6) ☐ Collection of data from voice, video, digital, or image recordings made for research purposes.

(7) ☑ Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies. (NOTE: Some research in this category may be exempt from the HHS regulations for the protection of human subjects. 45 CFR 46.101(b)(2) and (b)(3). This listing refers only to research that is not exempt).

(8) ☐ Continuing review of research previously approved by the convened IRB as follows: (a) where (i) the research is permanently closed to the enrollment of new subjects; (ii) all subjects have completed all research-related interventions; and (iii) the research remains active only for long-term follow-up of subjects; or (b) where no subjects have been enrolled and no additional risks have been identified; or (c) where the remaining research activities are limited to data analysis.

(9) ☐ Continuing review of research, not conducted under an investigational new drug application or investigational device exemption where categories two through eight do not apply but the IRB has determined and documented at a convened meeting that the research involves no greater than minimal risk and no additional risks have been identified.

__x__ **Please use the attached approved informed consent**

____ **You have been granted Waiver of Documentation of Consent**

According to 45 CFR 46.117, an IRB may waive the requirement for the investigator to obtaina signed consent form for some or all subjects if it finds either:

___ The research presents no more than minimal risk **AND**

___ The research involves procedures that do not require written consent when performed outside of a reserach setting 45 CFR 46.117(c)(2)

or

___ The principal risks are those associated with a breach of confidentiality concerning the subject's participation in the research **AND**

___ The consent document is the only record linking the subject with the research 45 CFR 46.117(c)(1)

Approval dates: 02/11/2005 02/11/2006 Protocol # 2004-11-0002

____ You have been granted Waiver of Informed Consent

According to 45 CFR 46.116(d), an IRB may waive or alter some or all of the requirements for Informed consent if:

___ The research presents no more than minimal risk to subjects;
___ The waiver will not adversely affect the rights and welfare of subjects;
___ The research could not practicably be carried out without the waiver; and
___ Whenever appropriate, the subjects will be provided with additional pertinent information after they have participated in the study.

RESPONSIBILITIES OF PRINCIPAL INVESTIGATOR FOR ONGOING PROTOCOLS:

(1) Report **immediately** to the IRB any severe adverse reaction or serious problem, whether anticipated or unanticipated.
(2) Report any significant findings that become known in the course of the research that might affect the willingness of subjects to continue to take part.
(3) Insure that only persons formally approved by the IRB enroll subjects.
(4) Use **only** a currently approved consent form (remember approval periods are for 12 months or less).
(5) **Protect the confidentiality of all personally identifiable information collected and train your staff and collaborators on policies and procedures for ensuring confidentiality of this information.**
(6) Submit for review and approval by the IRB all modifications to the protocol or consent form(s) prior to the implementation of the change.
(7) Submit a **Continuing Review Report** for continuing review by the IRB. Federal regulations require **IRB review of on-going projects no less than once a year** (a Continuing Review Report form and reminder letter will be sent to you 2 months before your expiration date). Please note however, that if you do not receive a reminder from this office about your upcoming continuing review, it is the primary responsibility of the PI not to exceed the expiration date in collection of any information. Finally, it is the responsibility of the PI to submit the Continuing Review Report before the expiration period.
(8) Notify the IRB when the study has been completed and complete the Final Report Form.
(9) Please help us help you by including the above protocol number on all future correspondence relating to this protocol.

Thank you for your help in this matter.

Sincerely,

Clarke Burnham, Ph.D., Chair
Institutional Review Board

cc: DRC

Print Form with Data | Save Form with Data

Appligent
Produced with Appligent Technology

OFFICE OF RESEARCH SUPPORT & COMPLIANCE

THE UNIVERSITY OF TEXAS AT AUSTIN

P.O. Box 7426, Austin, TX 78713 (512) 471-8871 - FAX (512) 471-8873
North Office Building A, Suite 5.200 (Mail Code A3200)

Date: **3/4/2005**

PI(s): **Wei-Fen Ma** Department & Mail Code: **NURSING SCHOOL** **D0100**

FWA# 00002030

Dear: **Wei-Fen Ma**

IRB APPROVAL - IRB Protocol # **2004-11-0002**

Title: **Predictors of regular physical activity for adults with anxiety in Taiwan.**

In accordance with Federal Regulations for review of research protocols, the Institutional Review Board has reviewed the above referenced protocol and found that it met approval for the following period of time:

Your amendment has been approved from 03/03/2005 – 02/11/2006
The following requested changes have been approved:

Add new clinics as participant sources

RESPONSIBILITIES OF PRINCIPAL INVESTIGATOR FOR ONGOING PROTOCOLS:

(1) Report **immediately** to the IRB any severe adverse reaction or serious problem, whether anticipated or unanticipated.
(2) Report any significant findings that become known in the course of the research that might affect the willingness of subjects to continue to take part.
(3) Insure that only persons formally approved by the IRB enroll subjects.
(4) Use **only** a currently approved consent form (remember approval periods are for 12 months or less).
(5) **Protect the confidentiality of all personally identifiable information collected and train your staff and collaborators on policies and procedures for ensuring confidentiality of this information.**
(6) Submit for review and approval by the IRB all modifications to the protocol or consent form(s) prior to the implementation of the change.
(7) Submit a **Continuing Review Report** for continuing review by the IRB. Federal regulations require **IRB review of on-going projects no less than once a year** (a Continuing Review Report form and reminder letter will be sent to you 2 months before your expiration date). Please note however, that if you do not receive a reminder from this office about your upcoming continuing review, it is the primary responsibility of the PI not to exceed the expiration date in collection of any information. Finally, it is the responsibility of the PI to submit the Continuing Review Report before the expiration period.
(8) Notify the IRB when the study has been completed and complete the Final Report Form.
(9) Please help us help you by including the above protocol number on all future correspondence relating to this protocol.

Thank you for your help in this matter.

Clarke Burnham, Ph.D., Chair
Institutional Review Board

cc: DRC

No. 23, Sec.1, Chung-Ga Road,
Taichung, Taiwan, 404
TEL: + 886 4 22015111

January 20, 2005

Wei-Fen Ma, RN, MSN, Ph.D. Candidate
3378 Lake Austin Blvd., Apt. #D,
Austin, TX 78703
LHDAISY@mail.utexas.edu

Dear Ms. MA:

The purpose of this letter is to grant Wei-Fen Ma, a graduate student at the University of Texas at Austin permission to conduct research at psychiatric clinics in Cheng Ching Hospital. The project, "Predictors of Regular Physical Activity for Adults with Anxiety in Taiwan" entails 100 participants aged 20 to 60 years to complete questionnaires in psychiatric clinics of Cheng Ching Hospital. The purpose is to test the research model for predicting physical activity for a population with anxiety. The Cheng Ching Hospital was selected because its good quality of caring for population with anxiety in Taiwan. A copy of the results will be provided and shared with Cheng Ching Hospital after this study completed. I, Liu, Yung-Chang do hereby grant permission for Wei-Fen Ma to conduct her project at psychiatric clinics in Cheng Ching Hospital.

Sincerely,

Yung-chang Liu

Yung-Chang Liu,

Chief, Department of Psychiatry,

Cheng Ching Hospital

No. 110, Sec. 1, Chien-Kuo N. Road,

Taichung, Taiwan 402

tejenlai@hotmail.com

February 22, 2004

Wei-Fen Ma, RN, MSN, Ph.D. Candidate
3378 Lake Austin Blvd., Apt. #D,
Austin, TX 78703
LHDAISY@mail.utexas.edu

Dear Ms. MA:

The purpose of this letter is to grant Wei-Fen Ma, a graduate student at the University of Texas at Austin permission to conduct research at psychiatric clinics of Chung-Shan Medical University Hospital. The project, "Predictors of Regular Physical Activity for Adults with Anxiety in Taiwan" entails 50 participants aged 20 to 60 years to complete questionnaires in psychiatric clinics of Chung-Shan Medical University Hospital. The purpose is to test the research model for predicting physical activity for a population with anxiety. The Chung-Shan Medical University Hospital was selected because its good quality of caring for population with anxiety in Taiwan. A copy of the results will be provided and shared with Chung-Shan Medical University Hospital after this study completed. I, Te-Jen Lai do hereby grant permission for Wei-Fen Ma to conduct her project at psychiatric clinics in Chung-Shan Medical University Hospital.

Sincerely,

Te-Jen Lai,

Chief, Department of Psychiatry,

Chung-Shan Medical University Hospital

No. 309, Sung-Te Rd.,
Taipei, Taiwan, 110
ilife.org@msa.hinet.net

January 25, 2005

Wei-Fen Ma, RN, MSN, Ph.D Candidate.
3378 Lake Austin Blvd., Apt. #D,
Austin, TX 78703
LHDAISY@mail.utexas.edu

Dear Ms. Ma:

The purpose of this letter is to grant Wei-Fen Ma, a graduate student at the University of Texas at Austin permission to conduct research at supportive groups from Life Improving & Loving Association. The project, "Predictors of Regular Physical Activity for Adults in Taiwan" entails 100 participants aged 20 to 60 years to complete questionnaires in groups. The purpose is to test the research model for predicting physical activity for a population with anxiety. The Life Improving & Loving Association was selected because it is an organization for supporting people with anxiety in Taiwan. After study finished, a copy of the results will be provided and shared with the organization. I, Liu, Hui-Ling do hereby grant permission for Wei-Fen Ma to conduct her research project at Life Improving & Loving Association.

Sincerely,

Hui-Ling Liu

Hui-Ling Liu

Director, Life Improving & Loving Association,

Taipei, Taiwan.

No. 2, Yuh-Der Road,
Taichung, Taiwan 404
hylane@www.cmuh.org.tw

January 3, 2005

Wei-Fen Ma, RN, MSN, Ph.D. Candidate
3378 Lake Austin Blvd., Apt. #D,
Austin, TX 78703
LHDAISY@mail.utexas.edu

Dear Ms. MA:

The purpose of this letter is to grant Wei-Fen Ma, a graduate student at the University of Texas at Austin permission to conduct research at clinics in Department of Psychiatry, China Medical University Hospital. The project, "Predictors of Regular Physical Activity for Adults with Anxiety in Taiwan" entails 300 participants aged 20 to 45 years to complete questionnaires in psychiatric clinics of China Medical University Hospital. The purpose is to test the research model for predicting physical activity for a population with anxiety. The China Medical University Hospital was selected because its good quality of caring for population with anxiety in Taiwan. A copy of the results will be provided and shared with China Medical University Hospital after this study completed. I, Hsien-Yuan Lane do hereby grant permission for Wei-Fen Ma to conduct her project at psychiatric clinics in China Medical University Hospital.

Sincerely,

Hsien-Yuan Lane

Hsien-Yuan Lane,

Chief, Department of Psychiatry,

China Medical University Hospital

11F, 134, Chung-Sun Rd,
Chung-Li, Taoyuan, Taiwan
320
psywu@apol-mp.com.tw

May 20, 2004

Wei-Fen Ma, RN, MSN, Ph.D Student
3378 Lake Austin Blvd., Apt. #D,
Austin, TX 78703
LHDAISY@mail.utexas.edu

Dear Ms. Ma:

The purpose of this letter is to grant Wei-Fen Ma, a graduate student at the University of Texas at Austin permission to conduct research at Hsin-Yuan counseling center. The project, "Predictors of Regular Physical Activity for Young Adults in Taiwan name of project" entails 30 participants aged 20 to 45 years to complete questionnaires in clinic center. The purpose is to examine the questionnaires and the procedure of data collection in this study. Hsin-Yuan counseling center was selected because the good quality of treatment people with anxiety in Taiwan. After study finished, a copy of the results will be provided and shared with the organization. I, Gou-Chin Wu do hereby grant permission for Wei-Fen Ma to conduct her research project at Hsin-Yuan counseling center.

Sincerely,

APPENDIX B

CONSENT FORM

IRB# _____

Informed Consent to Participate in Research

The University of Texas at Austin

You are being asked to participate in a research study. This form provides you with information about the study. The Principal Investigator (the person in charge of this research) or his/her representative will also describe this study to you and answer all of your questions. Please read the information below and ask questions about anything you don't understand before deciding whether or not to take part. Your participation is entirely voluntary and you can refuse to participate without penalty or loss of benefits to which you are otherwise entitled.

Title of Research Study:

Predictors of Regular Physical Activity for Adults with Anxiety in Taiwan.

Principal Investigator(s) (include faculty sponsor), UT affiliation, and Telephone Number(s):

Wei-Fen Ma, RN, MSN, PhD student.
No. 118-2, Aly. 3, Ln. 164, Chung-Sha RD., Ta-Tu Shinang, Taichung, Taiwan.
(04) 2691-1850

Faculty sponsor:
Professor Shirley Laffrey, Ph.D., RN, Dissertation Chairperson.
The University of Texas at Austin, School of Nursing,
1700 Red River, Austin, Texas 78703-1499.
(512) 471-9949

Funding source:

N/A

What is the purpose of this study?

The purpose of this research is to test the research model proposed concerning physical activity for a population with anxiety. The research model is developed to predict physical activity for adults with anxiety in Taiwan. The variables in the research model are related to personal factors, stress, anxiety and physical activity. In addition, social support, benefits, barriers and confidence related to physical activity are also included to predict physical activity performance.

What will be done if you take part in this research study?

If you decide to participate, you are requested to fill out a survey. You will be asked to answer a set of questions related to your regular physical activity and anxiety. The survey will take thirty to forty minutes to complete. You will be asked to respond to each item.

What are the possible discomforts and risks?

Two possible discomforts and risks may exist for participants in this study. The first is that you may feel tired, because you may need 20 to 40 minutes to finish the questionnaires of this study. To avoid this, you can take rest at anytime. The second risk is related to the content of the questionnaires. You may feel uncomfortable about answering some items. To avoid this, you can omit those items that make you feel uncomfortable. You can withdraw from the study at anytime without reason. You don't have any responsibility to finish the questionnaires.

What are the possible benefits to you or to others?

Your awareness of the importance of regular physical activity is the major potential benefit for participation. In addition, participating in this study will help improve your insight about influence factors that impact physical activity performance. In addition, the information you provide can help health care providers to plan more effective programs to promote participation in regular physical activity among adults with anxiety.

If you choose to take part in this study, will it cost you anything?

The University of Texas at Austin
Institutional Review Board
has approved this consent form
Approved: 02/11/2005
Expires: 02/11/2006

If you choose to take part in this study, you don't need to pay anything.

Will you receive compensation for your participation in this study?

To thank for your time, you will receive 10 dollars when you finish the survey.

What if you are injured because of the study?

In general, there is minimal risk for getting injury due to this study. If you are injured because of the study, you can contact the researchers of this study to get help.

If you do not want to take part in this study, what other options are available to you?

Participation in this study is entirely voluntary. You are free to refuse to be in the study, and your refusal will not influence current or future relationships with clinic.

How can you withdraw from this research study and who should I call if I have questions?

If you decide to participate, you are free to discontinue participation at any time without any question or explanation. If you have any questions, my dissertation chair or I will be happy to answer them. You may contact us at the following addresses:

Wei-Fen Ma
No. 118-2, Aly. 3, Ln. 164, Chung-Sha RD., Ta-Tu Shinang, Taichung, Taiwan.
(04) 2691-1850 (in Taiwan)

The University of Texas at Austin, School of Nursing,
1700 Red River, Austin, Texas 78703-1499.
(512) 471-4174 (in USA)

The University of Texas at Austin
Institutional Review Board
has approved this consent form
Approved: 02/11/2005
Expires: 02/11/2006

Shirley Laffrey, Ph.D., RN, Dissertation Chairperson.
The University of Texas at Austin, School of Nursing,
1700 Red River, Austin, Texas 78703-1499.
(512) 471-9949

If you wish to stop your participation in this research study for any reason, you should contact: Wei-Fen Ma **at (512) 479-4174 . You are free to withdraw your consent and stop participation in this research study at any time without penalty or loss of benefits for which you may be entitled. Throughout the study, the researchers will notify you of new information that may become available and that might affect your decision to remain in the study.**

In addition, if you have questions about your rights as a research participant, please contact Clarke A. Burnham, Ph.D., Chair, The University of Texas at Austin Institutional Review Board for the Protection of Human Subjects, 512/232-4383.

How will your privacy and the confidentiality of your research records be protected?

The data from you will be identified on the questionnaires and entered into the database using code numbers instead of names to protect confidentiality. All information will be kept locked in a file cabinet, and the researcher will have the only key to open it. In addition, all paper documents collected from you will be destroyed when the research is complete. Results and findings of this study will be reported as group information, not as an individual's data.

Authorized persons from The University of Texas at Austin and the Institutional Review Board have the legal right to review your research records and will protect the confidentiality of those records to the extent permitted by law. If the research project is sponsored then the sponsor also have the legal right to review your research records. Otherwise, your research records will not be released without your consent unless required by law or a court order.

If the results of this research are published or presented at scientific meetings, your identity will not be disclosed.

Will the researchers benefit from your participation in this *study*?

Your participation in this research helps the researcher to understand the phenomena related to adults with anxiety engaging in physical activity in Taiwan.

Signatures:

As a representative of this study, I have explained the purpose, the procedures, the benefits, and the risks that are involved in this research study:

Wei-Fen Ma

Signature and printed name of person obtaining consent **Date**

You have been informed about this study's purpose, procedures, possible benefits and risks, and you have received a copy of this Form. You have been given the opportunity to ask questions before you sign, and you have been told that you can ask other questions at any time. You voluntarily agree to participate in this study. By signing this form, you are not waiving any of your legal rights.

Printed Name of Subject **Date**

Signature of Subject **Date**

Wei-Fen Ma

Signature of Principal Investigator **Date**

The University of Texas at Austin
Institutional Review Board
has approved this consent form

Approved: 02/11/2005
Expires: 02/11/2006

邀請函

研究主題：

探討患有焦慮症狀的成人其運動行為之相關影響因素

您好：

我是美國德州大學奧斯汀分校，護理研究所博士班學生馬維芬。您被邀請參與一項有關成人運動行為的相關因素研究。此研究的目的在於瞭解曾經患有焦慮症狀的成人，其運動行為與影響運動行為習慣的因素。而您被邀請參與此項研究的原因在於您曾經因為失眠、擔憂等焦慮症狀來尋求協助。

此研究需要您填寫一份中文問卷，填寫的時間約需要三十分鐘，全部問卷皆採匿名填寫，只有編號，所以您的姓名絕對不會出現在問卷以及研究結果報告。如果您願意參與填寫此份問卷，請您在同意書上簽名，同意書將與問卷分開保管，同意書將於研究完成後燒毀，以確保您的權力。並且，您完全有拒絕參與填寫此份問卷的權力。您是

否參與填寫此份問卷的決定，也完全不會影響您與您尋求協助機構的關係。

為了感謝您的參與協助，每一次您填寫完一份問卷將可獲得新台幣 200 元現金。謝謝。

如果您有任何問題，歡迎您隨時提出，我與我的論文指導教授將極樂意為您解答。我們的聯絡地址與電話是：

馬維芬

台中縣大肚鄉蔗部村太平路一巷二弄七號。

電話： 0910562940

以及

Shirley C. Laffrey, Ph.D., RN.

The University of Texas at Austin, School of Nursing,

1700 Red River, Austin, TX, 78701-1499.

TEL: (512) 471-7311 （美國）

此外， 如果您有任何與參與研究之權力有關的問題，您也可以直接與美國德州大學人權發表委員會的督導聯繫。

電話是：(512) 232-4383 (美國).

敬祝

健康平安

馬維芬　敬上

2004,十二月.

APPENDIX C

PERMISSION LETTERS FOR USING THE INSTRUMENTS

Daisy UT

寄件者: "Karen Sechrist" <krsech@pacbell.net>
收件者: "Daisy UT" <lhdaisy@mail.utexas.edu>
傳送日期: 2004年11月4日 下午 02:08
附加檔案: EBBS Only.pdf
主旨: Re: Permission of EBBS

I am attaching a copy of the EBBS with the correct contact information on the bottom. If you downloaded the instrument from Dr. Pender's website, contact information on the bottom of the instrument is incorrect. Please use the attached copy of the instrument in your dissertation. You have our permission to put the English version in your dissertation. Best wishes. --K. Sechrist for Sechrist, Pender and Walker.

Daisy UT

寄件者: "Karen Sechrist" <krsech@pacbell.net>
收件者: "Daisy UT" <lhdaisy@mail.utexas.edu>
傳送日期: 2004年11月10日 下午 10:18
主旨: Re: Permission of EBBS

Wei-Fen Ma: Thank you for sending your proposal abstract and agreement statements. You have our permission to use the instrument in your research.

We appreciate your willingness to share the results of the performance of the instrument in your study designed to test a conceptual framework related to physical activity in a population with anxiety in Taiwan. Best wishes with your research. We look forward to the results of your work.

Karen R. Sechrist, PhD, RN
for Sechrist/Walker/Pender
18 Morningstar
Irvine, CA 92612-3745
(949) 854-7167
(949) 854-8532 (Fax)
(949) 433-7167 (Cell)
krsech@pacbell.net

Daisy UT

寄件者: "Cheung CK Jacky (SWK-RF)" <ckcheung@swk.cuhk.edu.hk>
收件者: "'Daisy UT'" <lhdaisy@mail.utexas.edu>
傳送日期: 2004年5月18日 上午 01:25
主旨: RE: stressful and pleasant life events

Dear Ms. Ma,

You are free to develop your research plan.
Thanks.

Yours sincerely,
Chau-kiu Cheung

-----Original Message-----
From: Daisy UT [mailto:lhdaisy@mail.utexas.edu]
Sent: Tuesday, May 18, 2004 3:23 PM
To: Cheung CK Jacky (SWK-RF)
Subject: Re: stressful and pleasant life events

Dear Dr. Cheung,

Thank you for your kindness.
I want to revise some items and the formate for my population.
May I have your permission to change your life events check list and to use in my pilot study and dissertation?
In addition,
May I have your address that I can sent the offical paper permission document to you?
Thanks

Sincerely
Wei-Fen Ma

Daisy UT

寄件者: "Jim Sallis" <sallis@mail.sdsu.edu>
收件者: "Daisy UT" <lhdaisy@mail.utexas.edu>
傳送日期: 2004年5月18日 上午 10:51
主旨: Re: permission of instruments

Hello,

You are welcome to translate and use these instruments. All I ask is that you send me an electronic version of the translated instruments.

You can download shorter versions and scoring instructions from my website (address below).

JSallis

At 10:08 PM 5/16/2004 -0500, you wrote:

> Dear Professor Sallis,
>
> My name is Wei-Fen Ma.
> I am a PhD student in the University of Texas at Austin, School of Nursing.
> I am interested in some of your instruments.
> My research title is:
> Regular Physical Activity for Young Adults with Anxiety in Taiwan.
>
> There are:
> Self-Efficacy Surveys for Exercise Behaviors.
> Social Support Surveys for Exercise Behaviors.
>
> am doing my pilot study this summer and will do my dissertation in this fall semester.
> plan to translate them and to use them im my pilot study and dissertation.
>
> May I have your permission about translating these two surveys and useing them in my pilot study and dissertation?
> Thanks
>
> Sincerely
> Wei-Fen Ma
>
> 3378 Lake Austin Blvd., Apt. #D, Austin, Texas, 78703
> (512) 479-4174
> email: lhdaisy@mail.utexas.edu

James F. Sallis, Ph.D.
Professor of Psychology, San Diego State University
Director, Active Living Research Program www.activelivingresearch.org
3900 Fifth Avenue, Suite 310, San Diego, CA 92103 USA
phone 619-260-5535; fax 619-260-1510
email <sallis@mail.sdsu.edu> PLEASE EXPECT DELAYS IN MY RESPONSES TO EMAILS
Website: www.drjamessallis.sdsu.edu

USF
UNIVERSITY OF
SOUTH FLORIDA

September 8, 2004

Ms. Wei-Fen Ma
3378 Lake Austin Blvd., Apt #D
Austin, TX 78703

Dear Ms. Ma:

In response to your recent request, I am very pleased to give you permission to reproduce the State-Trait Anxiety Inventory (STAI) for your research project (and associated work) entitled:

Predictors of Regular Physical Activity for Young Adults with Anxiety in Taiwan

It is my understanding that your research will be carried out at:

Taichung City, Taiwan

This permission is contingent on your agreement to share your research findings with us. I look forward to receiving further details about your procedures and the results of your study as such information becomes available.

Best wishes on your research project.

Sincerely,

Charles D. Spielberger, Ph.D., ABPP
Distinguished Research Professor of Psychology
Director, Center for Research in Behavioral
Medicine and Health Psychology
Phone (813) 974-2342; Fax (813) 974-4617

Daisy UT

寄件者: "sugar" <sugar@mail.ncku.edu.tw>
收件者: "Daisy UT" <lhdaisy@mail.utexas.edu>
傳送日期: 2004年5月16日 下午 04:53
主旨: Re: Permission of instruemtns

Dear Wei-Fen;

You have my permission to use EBBS & PYRPAQ instrument and to do any modification according to the results of your pilot study.

Ching-Huey Chen
2004/5/17

Wei-Fen Ma
3378 Lake Austin Blvd., Apt #D
Austin, TX 78703

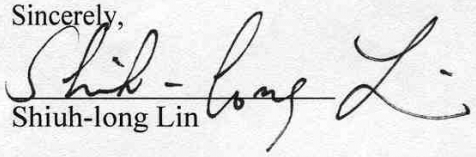
Dear Ms. Ma:

In response to your recent request, I am very pleased to give you permission to reproduce the 7-Day Physical Activity Recall Chinese version for your research project (and associated work) entitled:

Predictors of Regular Physical Activity for Adults with Anxiety in Taiwan

Best wishes on your research project.

Sincerely,



Shiuh-long Lin

Associate Professor & Dean of Student Affairs
Graduate Institute of Tourism and Health Science
National Taipei College of Nursing

(O): +886-2-2822-7101 #3220
(H): +886-2-2586-1755
Cell Phone: +886-938-157199
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APPENDIX D

ENGLISH VERSION OF INSTRUMENT PACKAGE

Demographic Data

Please fill in the blank or check the item in each category. Thanks.

1. Age: _____.

2. Gender: □ Male. □ Female.

3. Education: □ Master's degree or above. □ Baccalaureate degree.
□ Two or five-year college graduate.
□ Senior high school graduate.
□ Junior high school graduate.
□ Elementary school or private tutoring.
□ No schooling

4. Marital Status:
□ Single. □ Married. □ Divorced. □ Widowed.

5. Average personal income for each month (NT Dollars):
□ 9,999 or below. □ 10,000 to 19,999.
□ 20,000 to 29,999. □ 30,000 to 39,999.
□ 40,000 or above

6. Do you feel that your income is adequate to meet your needs?
□ Yes. □ No.

8. Do you have medical diagnosis as anxiety disorders?
□ Yes □ No

7. If item 8 is yes, which types of anxiety disorders you have?
□ Generalized Anxiety Disorder
□ Specific Fear and Phobias.
□ Social Phobia.
□ Panic Disorder and Agoraphobia.
□ Obsessive-Compulsive Disorder.
□ Posttraumatic Stress Disorder.

9. Are you currently taking medicine to treat anxiety?
□ Yes □ No

State-Trait Anxiety Inventory (Form Y-1)

Directions

A number of statements which people have used to describe themselves are given below. Read each statement and then circle the appropriate number to the right of the statement to indicate how you feel right now, that is, at this moment. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

		Not at all	*Somewhat*	*Moderately so*	*Very much so*
1	I feel calm.	1	2	3	4
2	I feel secure.	1	2	3	4
3	I feel tense.	1	2	3	4
4	I feel strained.	1	2	3	4
5	I feel at ease.	1	2	3	4
6	I feel upset.	1	2	3	4
7	I am presently worrying over possible misfortunes.	1	2	3	4
8	I feel satisfied.	1	2	3	4
9	I feel frightened.	1	2	3	4
10	I feel comfortable.	1	2	3	4
11	I feel self-confident.	1	2	3	4
12	I feel nervous.	1	2	3	4
13	I am jittery.	1	2	3	4
14	I feel indecisive.	1	2	3	4
15	I am relaxed.	1	2	3	4
16	I feel content.	1	2	3	4
17	I am worried.	1	2	3	4
18	I feel confused.	1	2	3	4
19	I feel steady.	1	2	3	4
20	I feel pleasant.	1	2	3	4

From: Spielberger, C. D. (1983). *State-trait anxiety inventory*. CA: Consulting Psychologists Press.

Form Y-2

Directions

A number of statements which people have used to describe themselves are given below. Read each statement and then circle the appropriate number to the right of the statement to indicate how you *generally* feel.

		Not at all	*Somewhat*	*Moderately so*	*Very much so*
21	I feel pleasant.	1	2	3	4
22	I feel nervous and restless.	1	2	3	4
23	I feel satisfied with myself.	1	2	3	4
24	I wish I could be as happy as others seem to be.	1	2	3	4
25	I feel like a failure.	1	2	3	4
26	I feel rested.	1	2	3	4
27	I am "calm, cool, and collected."	1	2	3	4
28	I feel that difficulties are piling up so that I cannot overcome them.	1	2	3	4
29	I worry too much over something that really doesn't matter.	1	2	3	4
30	I am happy.	1	2	3	4
31	I have disturbing thoughts.	1	2	3	4
32	I lack self-confidence.	1	2	3	4
33	I feel secure.	1	2	3	4
34	I make decisions easily.	1	2	3	4
35	I feel inadequate.	1	2	3	4
36	I am content.	1	2	3	4
37	Some unimportant thought runs through my mind and bothers me.	1	2	3	4
38	I take disappointments so keenly that I can't put them out of my mind.	1	2	3	4
39	I am a steady person.	1	2	3	4
40	I get in a state of tension or turmoil as I think over my recent concerns and interests.	1	2	3	4

From: Spielberger, C. D. (1983). *State-trait anxiety inventory*. CA: Consulting Psychologists Press.

Stressful life events check list
(translated from Chinese)

Each item has two parts:

A. Have you experienced these life events in the past six months? If yes, please make "∨" in the ☐ at beginning of each item.
B. What do you perceive stress for those life events you marked right now? ("1" is the least stress; "9" is the most stress)

Items	Least stress								Most stress
	1	2	3	4	5	6	7	8	9
1☐ Have new member in family	☐	☐	☐	☐	☐	☐	☐	☐	☐
2☐ Mother/Father died	☐	☐	☐	☐	☐	☐	☐	☐	☐
3☐ A relative died	☐	☐	☐	☐	☐	☐	☐	☐	☐
4☐ Family members moved out	☐	☐	☐	☐	☐	☐	☐	☐	☐
5☐ Got married	☐	☐	☐	☐	☐	☐	☐	☐	☐
6☐ Got divorced	☐	☐	☐	☐	☐	☐	☐	☐	☐
7☐ Spouse died	☐	☐	☐	☐	☐	☐	☐	☐	☐
8☐ Spouse separated	☐	☐	☐	☐	☐	☐	☐	☐	☐
9☐ Pet died	☐	☐	☐	☐	☐	☐	☐	☐	☐
10☐ Have a family meeting	☐	☐	☐	☐	☐	☐	☐	☐	☐
11☐ Lost job	☐	☐	☐	☐	☐	☐	☐	☐	☐
12☐ Spouse lost job	☐	☐	☐	☐	☐	☐	☐	☐	☐
13☐ Got promotion in work	☐	☐	☐	☐	☐	☐	☐	☐	☐
14☐ Changed job	☐	☐	☐	☐	☐	☐	☐	☐	☐
15☐ Spouse changed job	☐	☐	☐	☐	☐	☐	☐	☐	☐
Items	Least stress								Most stress
	1	2	3	4	5	6	7	8	9
16☐ Work load increased	☐	☐	☐	☐	☐	☐	☐	☐	☐
17☐ Work load decreased	☐	☐	☐	☐	☐	☐	☐	☐	☐
18☐ Income decreased	☐	☐	☐	☐	☐	☐	☐	☐	☐
19☐ Have financial problems	☐	☐	☐	☐	☐	☐	☐	☐	☐
20☐ Lost a lot of money	☐	☐	☐	☐	☐	☐	☐	☐	☐
21☐ Spouse lost a lot of money	☐	☐	☐	☐	☐	☐	☐	☐	☐
22☐ Working environment became worse	☐	☐	☐	☐	☐	☐	☐	☐	☐
23☐ Have conflicts with boss	☐	☐	☐	☐	☐	☐	☐	☐	☐
24☐ Began a new job	☐	☐	☐	☐	☐	☐	☐	☐	☐
25☐ Retired	☐	☐	☐	☐	☐	☐	☐	☐	☐

Items	Least stress								Most stress
	1	2	3	4	5	6	7	8	9
26☐ Bought a house	☐	☐	☐	☐	☐	☐	☐	☐	☐
27☐ Sold a house	☐	☐	☐	☐	☐	☐	☐	☐	☐
28☐ Moved	☐	☐	☐	☐	☐	☐	☐	☐	☐
29☐ Changed a lot of furniture	☐	☐	☐	☐	☐	☐	☐	☐	☐
30☐ Remodeled a house	☐	☐	☐	☐	☐	☐	☐	☐	☐
31☐ Argued with other people	☐	☐	☐	☐	☐	☐	☐	☐	☐
32☐Discussed social events with others	☐	☐	☐	☐	☐	☐	☐	☐	☐
33☐ Attended a party or dinner	☐	☐	☐	☐	☐	☐	☐	☐	☐
34☐ Been robbed	☐	☐	☐	☐	☐	☐	☐	☐	☐
35☐ Spouse been robbed	☐	☐	☐	☐	☐	☐	☐	☐	☐
36☐ Friends visited	☐	☐	☐	☐	☐	☐	☐	☐	☐
37☐ Have a new friend	☐	☐	☐	☐	☐	☐	☐	☐	☐
38☐ Broke up with a friend	☐	☐	☐	☐	☐	☐	☐	☐	☐
39☐ Met an old friend	☐	☐	☐	☐	☐	☐	☐	☐	☐
40☐ A friend died	☐	☐	☐	☐	☐	☐	☐	☐	☐
Items	Least stress								Most stress
	1	2	3	4	5	6	7	8	9
41☐ Helped other people	☐	☐	☐	☐	☐	☐	☐	☐	☐
42☐ Got hurt by a accident	☐	☐	☐	☐	☐	☐	☐	☐	☐
43☐ Got sick	☐	☐	☐	☐	☐	☐	☐	☐	☐
44☐ Spouse got sick	☐	☐	☐	☐	☐	☐	☐	☐	☐
45☐Was in hospital for treatment	☐	☐	☐	☐	☐	☐	☐	☐	☐
46☐ Have conflicts with spouse	☐	☐	☐	☐	☐	☐	☐	☐	☐
47☐ Have conflicts with parents in law	☐	☐	☐	☐	☐	☐	☐	☐	☐
48☐ Have conflicts with parents	☐	☐	☐	☐	☐	☐	☐	☐	☐
49☐ Have conflicts with children	☐	☐	☐	☐	☐	☐	☐	☐	☐
50☐ Watch news on TV	☐	☐	☐	☐	☐	☐	☐	☐	☐
51☐ Got pregnant	☐	☐	☐	☐	☐	☐	☐	☐	☐
52☐ Spouse got pregnant	☐	☐	☐	☐	☐	☐	☐	☐	☐
53☐ Children changed school	☐	☐	☐	☐	☐	☐	☐	☐	☐
54☐ Been in debt	☐	☐	☐	☐	☐	☐	☐	☐	☐
55☐ Spouse been in debt	☐	☐	☐	☐	☐	☐	☐	☐	☐

Items	Least stress								Most stress
	1	2	3	4	5	6	7	8	9
56☐ Lost driving license	☐	☐	☐	☐	☐	☐	☐	☐	☐
57☐Attended a new organization	☐	☐	☐	☐	☐	☐	☐	☐	☐
58☐ Been sued	☐	☐	☐	☐	☐	☐	☐	☐	☐
59☐Children have problems in school	☐	☐	☐	☐	☐	☐	☐	☐	☐
60☐ Attended a demonstration	☐	☐	☐	☐	☐	☐	☐	☐	☐
61☐ Supported candidate who lost the election	☐	☐	☐	☐	☐	☐	☐	☐	☐
62☐ Read books or watched TV about issues related China	☐	☐	☐	☐	☐	☐	☐	☐	☐
63☐ Read books or watched TV about psychology	☐	☐	☐	☐	☐	☐	☐	☐	☐
64☐ Read books or watched TV about philosophy, life or religion	☐	☐	☐	☐	☐	☐	☐	☐	☐
65☐ Read books about economic	☐	☐	☐	☐	☐	☐	☐	☐	☐
Items	Least stress								Most stress
	1	2	3	4	5	6	7	8	9
66☐ Been a guarantor	☐	☐	☐	☐	☐	☐	☐	☐	☐
67☐ Spouse been a guarantor	☐	☐	☐	☐	☐	☐	☐	☐	☐
68☐ Bought or sold stocks	☐	☐	☐	☐	☐	☐	☐	☐	☐
69☐ lost money in stock market	☐	☐	☐	☐	☐	☐	☐	☐	☐
70☐Got a new pet	☐	☐	☐	☐	☐	☐	☐	☐	☐
71☐ Read academic books	☐	☐	☐	☐	☐	☐	☐	☐	☐
72☐ Have a new hobby	☐	☐	☐	☐	☐	☐	☐	☐	☐
73☐ Had a serious loss	☐	☐	☐	☐	☐	☐	☐	☐	☐
74☐ Got a long vocation	☐	☐	☐	☐	☐	☐	☐	☐	☐
75☐Went to see an exhibition	☐	☐	☐	☐	☐	☐	☐	☐	☐
76☐ Changed eating behavior	☐	☐	☐	☐	☐	☐	☐	☐	☐
77☐Stopped or decreased smoking	☐	☐	☐	☐	☐	☐	☐	☐	☐
78☐Changed sleeping behavior	☐	☐	☐	☐	☐	☐	☐	☐	☐
79☐ Travel	☐	☐	☐	☐	☐	☐	☐	☐	☐
80☐Went to see a movie or music	☐	☐	☐	☐	☐	☐	☐	☐	☐
81 Others _____	☐	☐	☐	☐	☐	☐	☐	☐	☐
_____	☐	☐	☐	☐	☐	☐	☐	☐	☐

Revised from Cheung's (1998) Pleasant and Stressful Life Events.

EXERCISE BENEFITS/BARRIERS SCALE

DIRECTIONS: Below are statements that relate to ideas about exercise. Please indicate the degree to which you agree or disagree with the statements by circling SA for strongly agree, A for agree, D for disagree, or SD for strongly disagree.

		Strongly Agree	Agree	Disagree	Strongly Disagree
1.	I enjoy exercise.	SA	A	D	SD
2.	Exercise decreases feelings of stress and tension for me.	SA	A	D	SD
3.	Exercise improves my mental health.	SA	A	D	SD
4.	Exercising takes too much of my time.	SA	A	D	SD
5.	I will prevent heart attacks by exercising.	SA	A	D	SD
6.	Exercise tires me.	SA	A	D	SD
7.	Exercise increases my muscle strength.	SA	A	D	SD
8.	Exercise gives me a sense of personal accomplishment.	SA	A	D	SD
9.	Places for me to exercise are too far away.	SA	A	D	SD
10.	Exercising makes me feel relaxed.	SA	A	D	SD
11.	Exercising lets me have contact with friends and persons I enjoy.	SA	A	D	SD
12.	I am too embarrassed to exercise.	SA	A	D	SD
13.	Exercising will keep me from having high blood pressure.	SA	A	D	SD
14.	It costs too much to exercise.	SA	A	D	SD
15.	Exercising increases my level of physical fitness.	SA	A	D	SD
16.	Exercise facilities do not have convenient schedules for me.	SA	A	D	SD
17.	My muscle tone is improved with exercise.	SA	A	D	SD
18.	Exercising improves functioning of my cardiovascular system.	SA	A	D	SD
19.	I am fatigued by exercise.	SA	A	D	SD
20.	I have improved feelings of well being from exercise.	SA	A	D	SD
21.	My spouse (or significant other) does not encourage exercising.	SA	A	D	SD

(Continued on reverse side)

		Strongly Agree	Agree	Disagree	Strongly Disagree
22.	Exercise increases my stamina.	SA	A	D	SD
23.	Exercise improves my flexibility.	SA	A	D	SD
24.	Exercise takes too much time from family relationships.	SA	A	D	SD
25.	My disposition is improved with exercise.	SA	A	D	SD
26.	Exercising helps me sleep better at night.	SA	A	D	SD
27.	I will live longer if I exercise.	SA	A	D	SD
28.	I think people in exercise clothes look funny.	SA	A	D	SD
29.	Exercise helps me decrease fatigue.	SA	A	D	SD
30.	Exercising is a good way for me to meet new people.	SA	A	D	SD
31.	My physical endurance is improved by exercising.	SA	A	D	SD
32.	Exercising improves my self-concept.	SA	A	D	SD
33.	My family members do not encourage me to exercise.	SA	A	D	SD
34.	Exercising increases my mental alertness.	SA	A	D	SD
35.	Exercise allows me to carry out normal activities without becoming tired.	SA	A	D	SD
36.	Exercise improves the quality of my work.	SA	A	D	SD
37.	Exercise takes too much time from my family responsibilities.	SA	A	D	SD
38.	Exercise is good entertainment for me.	SA	A	D	SD
39.	Exercising increases my acceptance by others.	SA	A	D	SD
40.	Exercise is hard work for me.	SA	A	D	SD
41.	Exercise improves overall body functioning for me.	SA	A	D	SD
42.	There are too few places for me to exercise.	SA	A	D	SD
43.	Exercise improves the way my body looks.	SA	A	D	SD

EXERCISE CONFIDENCE SURVEY

Below is a list of things people might do while trying to increase or continue regular exercise. We are interested in exercises like running, swimming, brisk walking, bicycle riding, or aerobics classes.

Whether you exercise or not, please rate how confident you are that you could really motivate yourself to do things like these consistently, for al least six months.

Please circle one number for each question.

How sure are you that you can do these things?

		I know I cannot		Maybe I can		I know I can	Does not apply
1.	Get up early, even on weekends, to exercise.	1	2	3	4	5	(8)
2.	Stick to your exercise program after a long, tiring day at work.	1	2	3	4	5	(8)
3.	Exercise even though you are feeling depressed.	1	2	3	4	5	(8)
4.	Set aside time for a physical activity program; that is, walking, jogging, swimming, biking, or other continuous activities for at least 30 minutes, 3 times per week.	1	2	3	4	5	(8)
5.	Continue to exercise with others even though they seem too fast or too slow for you.	1	2	3	4	5	(8)
6.	Stick to your exercise program when undergoing a stressful life change (e.g., Divorce, death in the family, moving)	1	2	3	4	5	(8)
7.	Attend a party only after exercising.	1	2	3	4	5	(8)
8.	Stick to your exercise program when your family is demanding more time from you.	1	2	3	4	5	(8)
9.	Stick to your exercise program when you have household chores to attend to.	1	2	3	4	5	(8)
10.	Stick to your exercise program even when you have excessive demands at work.	1	2	3	4	5	(8)
11.	Stick to your exercise program when social obligations are very time consuming.	1	2	3	4	5	(8)
12.	Read or study less in order to exercise more.	1	2	3	4	5	(8)

From: Sallis, J. F., Pinski, Grossman, R. M., Patterson, T. L., and Nader, P. R. (1988). The development of self-efficacy scales for health-related diet and exercise behaviors. *Health Education Research*, 3, 283-292.

SOCIAL SUPPORT AND EXERCISE SURVEY

Below is a list of things people might do or say to someone who is trying to exercise regularly. If you are not trying to exercise, then some of the questions may not apply to you, but please read and give an answer to every question.

Please rate each question ***twice***. Under ***family***, rate how often anyone living in your household has said or done what is described during the last three months. Under ***friends***, rate how often your friends, acquaintances, or coworkers have said or done what is described during the last three months.

Please write one number from the following rating scale in each space:

none	rarely	a few times	often	very often	does not apply
1	2	3	4	5	8

During the past three months, my family (or members of my household) or friends:

		Family	Friends
1.	Exercise with me.	_____	_____
2	Offered to exercise with me.	_____	_____
3	Gave me helpful reminders to exercise ("Are you going to exercise tonight?")	_____	_____
4	Gave me encouragement to stick with my exercise program.	_____	_____
5	Changed their schedule so we could exercise together.	_____	_____
6	Discussed exercise with me.	_____	_____
7	Complained about the time I spend exercising.	_____	_____
8	Criticized me or made fun of me for exercising.	_____	_____
9	Gave me rewards for exercising (bought me something or gave me something I like)	_____	_____
10	Planned for exercise on recreational outings	_____	_____
11	Helped plan activities around my exercise.	_____	_____
12	Asked me for ideas on how they can get more exercise.	_____	_____
13	Talked about how much they like to exercise.	_____	_____

From: Sallis, J. F., Grossman, R. M., Pinski, R. B., Patterson, T. L., and Nader, P. R. (1987). The development of scales to measure social support for diet and exercise behaviors. *Preventive Medicine*, 16, 825-836.

Past Year Regular Physical Activity Checklist (by interview)
(translated from Chinese)

Please check the physical activities listed below in which you have performed at least once a week for the past year, except for special occasions such as sickness or poor weather conditions.

Each activity you perform need to be answered which levels you feel, how many minutes you spend on, how many days in one week you participate, and how many months in the past year for you participate that activity.

Level 1→feels easy to do, no increasing heart and breath rate, no sweat at all.
Level 2→feels comfortable but a little hard to finish, increasing breath and heart rate, sweat a little bit.
Level 3→ hard to finish activity, sweat a lot, breath and heart rate increasing a lot.

Activities	Levels	About how many minutes did you spend on each occasion?	On average, how many days in one week did you participate?	About how many months in the past year did you participate in that activity?
1 ☐ Walking Speed: _____ min. in. per 200 m.	_____	_____	_____	_____
2☐ Walking upstairs	_____	_____	_____	_____
3☐ Jogging or running	_____	_____	_____	_____
4☐ Aerobics or aerobic dancing	_____	_____	_____	_____
5☐ Biking	_____	_____	_____	_____
6☐ Hiking	_____	_____	_____	_____
7☐ Dancing	_____	_____	_____	_____
8☐ Martial arts (e.g. Tai Chi; yoga)	_____	_____	_____	_____
9☐ Swimming	_____	_____	_____	_____
10☐ Doing housecleaning	_____	_____	_____	_____
11☐ Shopping	_____	_____	_____	_____
12☐ Child care	_____	_____	_____	_____

13☐ Fishing	_____	_____	_____	_____
14☐ Occupation (note:)	_____	_____	_____	_____
15☐ Weight lifting	_____	_____	_____	_____
16☐ Calisthenics	_____	_____	_____	_____
17☐ Badminton	_____	_____	_____	_____
18☐ Tennis	_____	_____	_____	_____
19☐ Table tennis	_____	_____	_____	_____
20☐ Basketball	_____	_____	_____	_____
21☐ Baseball	_____	_____	_____	_____
22☐ Golf	_____	_____	_____	_____
23☐ Volleyball	_____	_____	_____	_____
24☐ Diving	_____	_____	_____	_____
25☐ Plant	_____	_____	_____	_____
26☐ Other_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

Revised from Chen's (1995) Past Year Regular Physical Activity Questionnaires.

The Seven-Day Recall

PAR#: 1 2 3 4 5 6 7 Participant_____

Interviewer_____Today is_____ Today's Date_____

1. Were you employed in the last seven days? 0. **No** (Skip to **Q#4**) 1. **Yes**
2. How many days of the last seven did you work? ____ days
3. How many total hours did you work in the last seven days? ____ hours last week
4. What two days do you consider your weekend days? _____ _____
   (mark days below with a squiggle)

WORKSHEET

		DAYS						
	SLEEP	1 __	2 __	3 __	4 __	5 __	6 __	7 __
MORNING	Moderate							
	Hard							
	Very Hard							
AFTERNOON	Moderate							
	Hard							
	Very Hard							
EVENING	Moderate							
	Hard							
	Very Hard							
Total Min Per Day	Strength:	____	____	____	____	____	____	____
	Flexibility:							

4a. Compared to your physical activity over the past three months, was last week's physical activity more, less or about the same?
1. More
2. Less
3. About the same

Worksheet Key:

An asterisk (*) denotes a work-related activity.
A squiggly line through a column (day) denotes a weekend day.

Rounding: 10-22 min.=.25 1:08-1:22 hr/min.=1.25
23-37 min.=.50
38-52 min.=.75
53-1:07 hr/min. =1.0

Sallis, J. F., Haskell, W., Wood, P. et al., (1985). Physical activity assessment methodology in the Five-City Project. *Am. J. Epidemiol*, 121, 91-106.

APPENDIX E

CHINESE VERSION OF INSTRUMENT PACKAGE

請在空格處填寫或圈選適合您的答案，謝謝。

1. 年齡： _____.

2. 性別： □ 男 □ 女

3. 教育程度： □ 碩士及碩士以上 □ 大學畢業
□ 專科畢業 □ 高中畢業
□ 國中畢業 □ 國小畢業
□ 國小肄業或未就讀學校

4. 婚姻狀況： □ 單身 □ 已婚 □ 同居
□ 離婚 □ 分居 □ 配偶過世

5. 工作： □ 全職工作 □ 兼差工作 □ 沒有工作
□ 退休 □ 家庭主婦 /夫

6. 收入： □ 9,999元 或以下
□ 10,000 到 19,999元
□ 20,000 到 29,999元
□ 30,000 到 39,999元
□ 40,000 元 或以上

7. 您覺得您的收入夠支付您的需要嗎？ □ 夠 □ 不夠

8. 請問您目前有被醫生診斷爲焦慮症嗎？ □ 無 □ 有
若有，請問您的診斷是： □ 強迫症 □ 恐慌症 □ 社交恐慌症
□ 重大創傷症候群 □ 一般廣泛焦慮症 □ 懼曠症

9. 請問您目前有使用藥物來幫助解決焦慮的問題嗎？
□ 有 □ 沒有

情境特質焦慮 (Y-1) 中文量表

一般人會用以下項目來形容自己的心理狀態。請您針對每一個項目，圈選出符合您**此時此刻**的心理感受。所有的項目沒有所謂對或錯的答案。請勿花太多時間專注在任何一個項目上，直接圈選出最適合您**現在感受的描述**即可。謝謝。

項目	內容	非常不同意	不同意	同意	非常同意
1	我現在感到鎮定	1	2	3	4
2	我現在覺得安全	1	2	3	4
3	我現在感到緊張	1	2	3	4
4	我現在感到很有壓力	1	2	3	4
5	我現在覺得自在	1	2	3	4
6	我現在感到鬱悶	1	2	3	4
7	我現在非常擔憂可能會發生不幸的事情	1	2	3	4
8	我現在感到滿意	1	2	3	4
9	我現在感到害怕	1	2	3	4
10	我現在感到舒適	1	2	3	4
11	我現在感到自信	1	2	3	4
12	我現在覺得焦慮	1	2	3	4
13	我現在感到神經敏感	1	2	3	4
14	我現在感到無法做決定	1	2	3	4
15	我現在很放鬆	1	2	3	4
16	我現在心理上感到很滿足	1	2	3	4
17	我現在感到擔心	1	2	3	4
18	我現在覺得困惑	1	2	3	4
19	我現在感到平靜	1	2	3	4
20	我現在感到愉快	1	2	3	4

情境特質焦慮 (Y-2) 中文量表

以下項目是形容**平時一般情形**的心理狀態，請您瀏覽每一個項目，並圈選出符合您**平時一般情形的描述**。謝謝。

項目	內容	非常不同意	不同意	同意	非常同意
21	我常常感到愉悅	1	2	3	4
22	我常常會緊張與不安	1	2	3	4
23	我常常對自我感到滿意	1	2	3	4
24	我常常希望自己能像別人一樣快樂	1	2	3	4
25	我常常覺得自己是一個失敗者	1	2	3	4
26	我常常覺得很放心	1	2	3	4
27	我是一個冷靜沈著的人	1	2	3	4
28	我常常覺得麻煩很多而且無法克服	1	2	3	4
29	我常常煩惱很多不重要的事情	1	2	3	4
30	我常常很快樂	1	2	3	4
31	我常常會心神不寧	1	2	3	4
32	我缺乏自信	1	2	3	4
33	我常常覺得安全	1	2	3	4
34	我通常容易下決定	1	2	3	4
35	我常常感到無能爲力	1	2	3	4
36	我常常感到滿足	1	2	3	4
37	有時會有一些不重要的念頭困擾我	1	2	3	4
38	我很在乎別人對我的批評，很難不去管它	1	2	3	4
39	我是一個很穩定的人	1	2	3	4
40	當我想到最近發生的事情時就會緊張	1	2	3	4

運動好處與障礙評量表

以下是一些與運動相關的敘述，請依照您對該項描述同意或不同意的程度，圈選出最接近您感覺的答案。

項目	內容	非常不同意	不同意	同意	非常同意
1	運動對我而言是一種享受	□	□	□	□
2	運動減低我的壓力與緊張的感覺	□	□	□	□
3	運動增進我的心理精神健康	□	□	□	□
4	運動花費我太多時間	□	□	□	□
5	我會以運動來預防心臟病	□	□	□	□
6	運動使我覺得累	□	□	□	□
7	運動增加我肌肉的力量	□	□	□	□
8	運動使我覺得有成就感	□	□	□	□
9	我可以運動的地方都太遠了	□	□	□	□
10	運動使我覺得舒暢	□	□	□	□
11	運動使我能接觸一些朋友以及我喜歡的人	□	□	□	□
12	我覺得很不好意思去運動	□	□	□	□
13	運動可使我避免高血壓	□	□	□	□
14	運動太花錢了	□	□	□	□
15	運動可增強我的身體狀況	□	□	□	□
16	運動場所開放時間對我不方便	□	□	□	□
17	運動增加我肌肉的結實度	□	□	□	□
18	運動改善我心臟血管系統的功能	□	□	□	□
19	運動使我感到疲憊	□	□	□	□
20	運動使我覺得活得更好	□	□	□	□

項目	內容	非常不同意	不同意	同意	非常同意
21	我的配偶 (或最親近的人) 不鼓勵我運動	□	□	□	□
22	運動增加我的耐力	□	□	□	□
23	運動增加我身體的柔軟度	□	□	□	□
24	運動佔去太多與家人相處的時間	□	□	□	□
25	運動改善我的性情	□	□	□	□
26	運動幫助我晚上睡得更好	□	□	□	□
27	運動可使我長壽	□	□	□	□
28	我覺得穿運動服的人看起來很滑稽	□	□	□	□
29	運動幫助我減少疲倦感	□	□	□	□
30	運動是我認識新朋友的一個好方法	□	□	□	□
31	運動改善我的體力	□	□	□	□
32	運動改善我對自己的看法	□	□	□	□
33	我的家人不鼓勵我運動	□	□	□	□
34	運動增加我腦筋清醒的程度	□	□	□	□
35	運動使我在做平常日常生活事情時避免疲憊	□	□	□	□
36	運動改善我的生活品質	□	□	□	□
37	運動佔去太多時間影響我對家庭的責任	□	□	□	□
38	對我來說，運動是一項好的娛樂	□	□	□	□
39	運動使別人更容易接受我	□	□	□	□
40	對我來說，運動是一項辛苦的工作	□	□	□	□
41	運動改善我全身的身體功能	□	□	□	□
42	太少地方可讓我運動了	□	□	□	□
43	運動改善我身體的外型	□	□	□	□

From: Chen, C. H. (1995). *Physical exercise and sense of well-being among Chinese elderly in Taiwan.* Unpublished Doctoral Dissertation, University of Texas at Austin, Texas.

生活壓力事件

以下每一個項目包括兩個部分：

1. 在過去六個月中，您是否經歷以下項目之生活事件？如果有，請在 □ 勾選該題，如果沒有，則可以直接忽略該題。
2. 如果您在六個月內曾經歷該項事件，請您評估<u>該事件對您現在而言的壓力有多大？</u> (“1”是不覺得有壓力; “9”仍感到非常大的壓力)

在過去六個月內曾經發生在我身上的事件：　　現在我對這事件感到的壓力爲：

項目	壓力很小								壓力很大
	1	2	3	4	5	6	7	8	9
1 □ 家中有新成員	□	□	□	□	□	□	□	□	□
2 □ 父親或母親過世	□	□	□	□	□	□	□	□	□
3 □ 一個親戚過世	□	□	□	□	□	□	□	□	□
4 □ 家中成員搬出	□	□	□	□	□	□	□	□	□
5 □ 結婚	□	□	□	□	□	□	□	□	□
6 □ 離婚	□	□	□	□	□	□	□	□	□
7 □ 配偶過世	□	□	□	□	□	□	□	□	□
8 □ 寵物死亡	□	□	□	□	□	□	□	□	□
9 □ 有一個新寵物	□	□	□	□	□	□	□	□	□
10 □ 開家庭會議	□	□	□	□	□	□	□	□	□
項目	壓力很小								壓力很大
	1	2	3	4	5	6	7	8	9
11 □ 失業	□	□	□	□	□	□	□	□	□
12 □ 配偶失業	□	□	□	□	□	□	□	□	□
13 □ 工作升遷	□	□	□	□	□	□	□	□	□
14 □ 換工作	□	□	□	□	□	□	□	□	□
15 □ 配偶換工作	□	□	□	□	□	□	□	□	□
16 □ 工作負擔增加	□	□	□	□	□	□	□	□	□
17 □ 工作負擔減少	□	□	□	□	□	□	□	□	□
18 □ 收入減少	□	□	□	□	□	□	□	□	□
19 □ 財務上有困難	□	□	□	□	□	□	□	□	□
20 □ 遺失一大筆錢財	□	□	□	□	□	□	□	□	□
21 □ 配偶遺失一大筆錢財	□	□	□	□	□	□	□	□	□
22 □ 工作環境變差	□	□	□	□	□	□	□	□	□
23 □ 和老闆吵架	□	□	□	□	□	□	□	□	□
24 □ 開始一個新工作	□	□	□	□	□	□	□	□	□
25 □ 退休	□	□	□	□	□	□	□	□	□

項目	壓力很小								壓力很大
	1	2	3	4	5	6	7	8	9
26 ☐ 買房子	☐	☐	☐	☐	☐	☐	☐	☐	☐
27 ☐ 賣房子	☐	☐	☐	☐	☐	☐	☐	☐	☐
28 ☐ 搬家	☐	☐	☐	☐	☐	☐	☐	☐	☐
29 ☐ 換大量家具	☐	☐	☐	☐	☐	☐	☐	☐	☐
30 ☐ 重新裝潢房子	☐	☐	☐	☐	☐	☐	☐	☐	☐
31 ☐ 和別人吵架	☐	☐	☐	☐	☐	☐	☐	☐	☐
32 ☐ 和他人討論社會事件	☐	☐	☐	☐	☐	☐	☐	☐	☐
33 ☐ 參加舞會或是聚餐	☐	☐	☐	☐	☐	☐	☐	☐	☐
34 ☐ 被搶	☐	☐	☐	☐	☐	☐	☐	☐	☐
35 ☐ 看社會新聞節目	☐	☐	☐	☐	☐	☐	☐	☐	☐
36 ☐ 朋友來訪	☐	☐	☐	☐	☐	☐	☐	☐	☐
37 ☐ 交新朋友	☐	☐	☐	☐	☐	☐	☐	☐	☐
38 ☐ 和朋友吵架分手	☐	☐	☐	☐	☐	☐	☐	☐	☐
39 ☐ 遇見老朋友	☐	☐	☐	☐	☐	☐	☐	☐	☐
40 ☐ 朋友過世	☐	☐	☐	☐	☐	☐	☐	☐	☐
項目	壓力很小								壓力很大
	1	2	3	4	5	6	7	8	9
41 ☐ 幫助他人	☐	☐	☐	☐	☐	☐	☐	☐	☐
42 ☐ 發生意外受傷	☐	☐	☐	☐	☐	☐	☐	☐	☐
43 ☐ 生病	☐	☐	☐	☐	☐	☐	☐	☐	☐
44 ☐ 配偶生病	☐	☐	☐	☐	☐	☐	☐	☐	☐
45 ☐ 到醫院接受治療	☐	☐	☐	☐	☐	☐	☐	☐	☐
46 ☐ 與配偶起爭執	☐	☐	☐	☐	☐	☐	☐	☐	☐
47 ☐ 與公婆/岳父母 起爭執	☐	☐	☐	☐	☐	☐	☐	☐	☐
48 ☐ 與父母起爭執	☐	☐	☐	☐	☐	☐	☐	☐	☐
49 ☐ 與小孩起爭執	☐	☐	☐	☐	☐	☐	☐	☐	☐
50 ☐ 配偶被搶	☐	☐	☐	☐	☐	☐	☐	☐	☐
51 ☐ 懷孕	☐	☐	☐	☐	☐	☐	☐	☐	☐
52 ☐ 配偶懷孕	☐	☐	☐	☐	☐	☐	☐	☐	☐
53 ☐ 小孩換學校	☐	☐	☐	☐	☐	☐	☐	☐	☐
54 ☐ 借貸	☐	☐	☐	☐	☐	☐	☐	☐	☐
55 ☐ 配偶借貸	☐	☐	☐	☐	☐	☐	☐	☐	☐

項目	壓力很小								壓力很大
	1	2	3	4	5	6	7	8	9
56 □ 遺失證件	□	□	□	□	□	□	□	□	□
57 □ 參加一個新的組織	□	□	□	□	□	□	□	□	□
58 □ 被他人告	□	□	□	□	□	□	□	□	□
59 □ 小孩在學校出現問題	□	□	□	□	□	□	□	□	□
60 □ 參加示威活動	□	□	□	□	□	□	□	□	□
61 □ 支持的候選人落選	□	□	□	□	□	□	□	□	□
62 □ 看有關兩岸議題的電視節目或書	□	□	□	□	□	□	□	□	□
63 □ 看有關心理層面的電視或書籍	□	□	□	□	□	□	□	□	□
64 □ 看有關人生哲學或宗教的電視或書	□	□	□	□	□	□	□	□	□
65 □ 看有關財物經濟的電視節目或書籍	□	□	□	□	□	□	□	□	□
項目	壓力很小								壓力很大
	1	2	3	4	5	6	7	8	9
66 □ 當保證人	□	□	□	□	□	□	□	□	□
67 □ 配偶當保證人	□	□	□	□	□	□	□	□	□
68 □ 分居	□	□	□	□	□	□	□	□	□
69 □ 買賣股票	□	□	□	□	□	□	□	□	□
70 □ 股票市場變動	□	□	□	□	□	□	□	□	□
71 □ 讀學術上的書籍文章	□	□	□	□	□	□	□	□	□
72 □ 有新嗜好	□	□	□	□	□	□	□	□	□
73 □ 遺失重要物品	□	□	□	□	□	□	□	□	□
74 □ 放長假	□	□	□	□	□	□	□	□	□
75 □ 看展覽	□	□	□	□	□	□	□	□	□
76 □ 改變飲食習慣	□	□	□	□	□	□	□	□	□
77 □ 減少抽煙或戒煙	□	□	□	□	□	□	□	□	□
78 □ 改變睡眠習慣	□	□	□	□	□	□	□	□	□
79 □ 去旅遊	□	□	□	□	□	□	□	□	□
80 □ 看場電影或聽音樂會	□	□	□	□	□	□	□	□	□
81 其他 _____	□	□	□	□	□	□	□	□	□
_____	□	□	□	□	□	□	□	□	□

社會支持與運動評量表

以下的項目是去瞭解家人與朋友對一個人可能從事規律運動的影響。如果您最近並沒有從事規律的運動，以下許多題目也許和您的經驗不同。但是仍請您仔細讀每個題目，以及選擇適合您個人情況的答案。

每一個題目請讀兩次。第一次以**家人（或住在同一家庭的成員）**爲對象，評估他們在過去三個月內曾經說過或做過該項行爲的頻率。第二次以朋友爲對象，評估您的**朋友（認識的熟人或同事）**在過去三個月內曾經說過或做過該項行爲的頻率。謝謝。

請依照量表中的數字所代表的意義，在各項題目的空格中填下所代表的數字。 (“1” 爲從來沒有發生過；”5”爲總是發生；”8” 爲無法判斷。)

從來沒有　很少出現　曾經有幾次　經常出現　總是出現　無法判斷

1　2　3　4　5　8

過去三個月中，我的家人 (或是住在家中的成員) 以及我的朋友：

	內容	家人	朋友
1	曾經陪我一起做運動	_____	_____
2	曾經表示願意與我一起運動	_____	_____
3	曾經提醒我去運動 (如表示”你今晚要去運動嗎?”)	_____	_____
4	曾經鼓勵我繼續運動	_____	_____
5	曾經改變他們的日常生活作息，使我們可以一起去運動	_____	_____
6	曾經與我討論有關運動的話題	_____	_____
7	曾經抱怨我花時間去運動	_____	_____
8	曾經批評或取笑我運動的行爲	_____	_____
9	曾經給我獎勵鼓勵我繼續運動 (買禮物給我或是送我喜歡的物品)	_____	_____
10	曾經針對運動比賽而訂定運動計畫	_____	_____
11	曾經協助我做運動計畫	_____	_____
12	曾經詢問我如何使他們增加運動的想法	_____	_____
13	曾經與我談論有關他們對運動喜好的話題	_____	_____

自我執行能力與運動評量表

以下的項目，是針對個人嘗試增加或持續**正在**從事規律的運動行爲所可能具備的態度。這裡的運動指的如跑步、游泳、散步、騎腳踏車，以及參加類似有氧運動課程。

無論您平常是否運動，請您評估過去的六個月中，針對自己參與運動執行能力的信心程度做一個判斷。並針對以下每一個項目，圈選適合您個人情況的答案。謝謝。

	內容	我認爲我不能		也許我能		我認爲我能	無法判斷
1	我會早起運動，即使在假日也如此	1	2	3	4	5	(8)
2	我會堅持自我的運動計畫，即使一整天下來工作已經很疲倦	1	2	3	4	5	(8)
3	即使在我心情鬱悶不好，我仍持續運動	1	2	3	4	5	(8)
4	我會撥出額外的時間參加運動課程，如散步，慢跑、游泳、及單車，或是其他的運動。每次運動時間至少30分鐘，一星期至少三次。	1	2	3	4	5	(8)
5	我會持續地和別人一起運動，即使我的運動速度比別人快一些或慢一些	1	2	3	4	5	(8)
6	我會堅持繼續作運動，即使我正面臨生活上的一些改變 (如離婚、家人過世、搬家)	1	2	3	4	5	(8)
7	即使要參加聚會，我也會先做完運動	1	2	3	4	5	(8)
8	在家人要求我更多的時間陪他們，我仍會持續自己的運動計畫	1	2	3	4	5	(8)
9	當我有許多家事需要處理時，我仍持續參與自己的運動計畫	1	2	3	4	5	(8)
10	當工作負擔很大時，我仍持續自己的運動計畫	1	2	3	4	5	(8)
11	當我花時很多時間在從事志工服務時，我仍持續自己的運動計畫	1	2	3	4	5	(8)
12	我會爲了運動減少讀書的時間	1	2	3	4	5	(8)

過去一年身體活動習慣問卷表

除了特殊情況外，請您再一次回憶，過去一年中有哪些輕度、中度、與重度的身體活動是您花固定時間所做的。請您說明做該項活動時體力的消耗程度，以及每次活動所花的時間與每星期所花的次數。

有關體力消耗程度請用以下所描述的方式回答：

“1”代表「輕度活動」：一點也不吃力，好像散步一樣輕鬆，不會有呼吸加快，心跳加快，或出汗的現象。
“2”代表「中度活動」：有吃力的感覺，但身體仍然覺得舒服，有一點出汗，呼吸及心跳亦有增加的感覺。
“3”代表「重度活動」：很吃力，大量出汗，呼吸及心跳明顯的增加。

活動	體力消耗程度	每次運動所花的時間	平均來說，一星期大約幾天	一年中大概有幾個月您是按照此方式運動
1 □ 走路　約200公尺需要___分鐘	_____	_____	_____	_____
2 □ 爬樓梯 共___層	_____	_____	_____	_____
3 □ 跑步或慢跑	_____	_____	_____	_____
4 □ 有氧運動、舞蹈	_____	_____	_____	_____
5 □ 騎腳踏車	_____	_____	_____	_____
6 □ 徒步健行	_____	_____	_____	_____
7 □ 舞蹈(如交際舞)	_____	_____	_____	_____
8 □ 中國武術 (如 太極、瑜珈、香功)	_____	_____	_____	_____
9 □ 游泳	_____	_____	_____	_____
10 □ 購物	_____	_____	_____	_____
11 □ 舉重 (含啞吟)	_____	_____	_____	_____
12 □ 釣魚	_____	_____	_____	_____
13 □ 體操	_____	_____	_____	_____
14 □ 羽毛球	_____	_____	_____	_____
15 □ 網球	_____	_____	_____	_____

運動	體力消耗程度	每次運動花多少分鐘	平均來說，一星期大約活動幾天	一年中大概有多少個月是按此方式活動
16.1 □ 家事				
如：擦地板	_____	_____	_____	_____
16.2 □ 手洗衣服	_____	_____	_____	_____
16.3 □ 機器洗衣服	_____	_____	_____	_____
16.4 □ 曬衣物	_____	_____	_____	_____
16.5 □ 丟垃圾	_____	_____	_____	_____
16.6 □ 清潔家具	_____	_____	_____	_____
16.7 □ 洗碗	_____	_____	_____	_____
16.8 □ 準備三餐	_____	_____	_____	_____
16.9 □ 擦窗戶	_____	_____	_____	_____
17 □ 照顧孩童__歲	_____	_____	_____	_____
18 □ 職業相關活動 (名稱:)	_____	_____	_____	_____
19 □ 桌球	_____	_____	_____	_____
20 □ 籃球	_____	_____	_____	_____
21 □ 棒球	_____	_____	_____	_____
22 □ 高爾夫球	_____	_____	_____	_____
23 □ 保齡球	_____	_____	_____	_____
24 □ 潛水	_____	_____	_____	_____
25 □ 種植花草	_____	_____	_____	_____
26 □ 睡覺	_____	_____	_____	_____
27 □ 看電視、電影、書及聽音樂	_____	_____	_____	_____
28 □ 其他 _____	_____	_____	_____	_____

附錄七 身體活動七日回憶法訪視表(7-d PAR)

身體活動七日回憶法訪視表

受訪者姓名：_____
受訪者編號：_____
受訪者係第 1 2 3 4 5 6 7 次接受訪視(請圈選)。
訪員姓名：_____
訪視日期：____年_月_日，星期__

1.過去七天有無從事某項職業工作？□無(跳答 4)，□有
2.過去七天你工作了幾天？____天
3.過去七天你工作了多少小時？_____
4.那兩天是你所認為的週末？星期____及星期____

訪視日期								
星期								
睡眠時間(時)								
上午	中度							
	重度							
	非常重度							
下午	中度							
	重度							
	非常重度							
晚上	中度							
	重度							
	中度							
每天幾分鐘	肌力							
	柔軟度							

4a.你上週之身體活動與過去 3 個月來之身體活動相較，
1.□較多 2.□較少 3.□差不多(請勾選)

※注意事項：

1.與從事某項職業有關之工作，其時間之右側請標記＊星號。

2.請以鋸齒線或螢光筆標記週末，以資區隔週末與平日。

3.四捨五入規則：10-22 分=.25 時，23-37 分=.50 時，38-52 分=.75 時，53 分-1 小時 7 分=1.0 時，1 小時 8 分-1 小時 22 分=1.25 時。

以下係**訪員**填答及補充註記部份，請訪員回答下面之題目。

5.在訪視過程中有無任何問題？□無□有(請加以解釋說明)

請說明你所發現之任何問題：

6.你認為這次的訪視是否有效？□無效□有效

7.請列出任何你所無法歸類屬於何種強度之活動

8.請提供本次訪視任何有關你個人的看法、意見及評語

此份問卷到此結束，謝謝您犧牲寶貴的時間來參與本研究。

APPENDIX F

LIST OF EXPERTS FOR

TRANSLATION AND BACK-TRANSLATION INSTRUMENTS

Pei-Hua Chen, Ph. D. Candidate,
Department of Education Psychology,
University of Texas at Austin.

Hsiu-Min Tsai, Ph. D. Candidate,
School of Nursing,
University of Texas at Austin.

Ching-Yu Cheng, Ph. D. Candidate,
School of Nursing,
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Henry Guevara, Ph. D. Candidate,
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School of Nursing,
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I-Chi Wang, Ph. D. Candidate,
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University of Texas at Austin.

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